Behind Dollar Savings in Mutual Funds: Are Shifting Sands Threatening Financial Stability?*

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Abstract

I unveil the predominance of money market-like mutual funds as source of dollar savings in emerging markets and explore its consequences for financial stability. Using Peruvian data, I find that households significantly save dollars in mutual funds specialized in deposit investments, especially in foreign banks. This choice enables them to earn higher returns compared to saving in domestic banks. I associate this excess return to the ability of mutual funds to break the traditional market segmentation of dollar deposits. I identify a trade-off regarding the effects on financial stability. On one side, the financial system is less exposed to exchange rate risk as a sizable share of dollar savings is invested abroad. On the other side, mutual funds become significant term-deposit holders in domestic banks, which makes banks prone to withdrawals. After a meaningful mutual fund redemption, banks substantially financed by mutual funds increased their loan rates and sold their dollar securities.

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1 Introduction

Understanding the global prevalence of dollar borrowing and savings is of great interest due to its far-reaching implications for the international financial system and its significant impact on multiple countries. Emerging markets warrant special attention due to past financial crises associated with dollarization, such as the East Asian and Tequila crises in the 1990s or more recently the Turkish crisis in 2018. During such events, the accumulation of dollar-denominated debt, currency mismatches, and currency devaluation significantly worsen the financial stability of such economies. As dollar debt its funded by the accumulation of dollar savings, understanding the motives for saving in dollars is first order. Our comprehension of the impact of dollar savings on emerging market economies primarily stems from the role of banks because they were the main source for household savings. However, other financial intermediaries such as money market-like mutual funds have been increasing their importance over time and their consequences are far less known.

The implications for financial stability of the growth of money market-like mutual funds goes beyond emerging markets. In a report following the onset of the Covid outbreak, the European Central Bank identified that stress in money market funds could potentially pose risks to the broader financial system. This risk primarily arises because, during crises, substantial outflows from these funds could force them to sell assets, thereby disproportionately affecting financial intermediaries that rely on money market funds. Another risk factor for international banks based on Europe lies in the potential liquidity strains within denominated money market funds in dollars, which could also propagate towards institutions with dollar liquidity needs. Overall, studying the connection between money market funds and financial intermediaries is relevant.

In this paper, I investigate the predominance of money market-like mutual funds in emerging markets as a source of dollar savings and examine its implications for financial stability. More specifically, I aim to answer the following questions: Why do households in emerging markets allocate their dollar savings in mutual funds instead of traditional banks? How does the significance of mutual funds as a dollar savings instrument impact the stability of banks and the broader financial system? I start my analysis by documenting a novel pattern in international finance: the prevalence of money market-like mutual funds as a source of dollar savings in emerging markets. I show that dollar savings in mutual funds are significative and that mutual fund dollarization is a phenomenon spread across multiple emerging markets. Also, using a small sample of representative dollarized emerging markets, I find that a

significant share of savings allocated to money market-like mutual funds, which is not the case for develop economies where the predominant ones are equity funds. Additionally, to provide a detailed answer to the main questions, I will focus my empirical inspection on a representative emerging market economy in terms of deposit dollarization, Peru, and I will study the phenomenon through the lens of a simple theoretical model.

In the first part of the analysis, using Peruvian data, I show that households significantly save dollars in money market-like mutual funds specialized in deposit investments, especially in foreign banks. Moreover, I find that households earn an annual excess return of around 0.42% for saving dollars in mutual funds instead of banks. The behavior of households for choosing mutual funds over banks is consistent with the existence of this excess return. The presence of the dollar mutual fund excess return is more related with the ability of mutual funds to break the local market segmentation of deposits than with a conventional riskiness explanation. Traditionally, due to regulatory constraints, dollar savings of households in emerging markets were restricted to the conditions of their local deposit market conditions. However, mutual funds can invest their funds abroad, which potentially allows them to earn higher returns than in the domestic market. For instance, a Peruvian mutual fund could allocate their funds in a 12-month dollar deposit account in a Panamanian bank that pays 1.5% more than a Peruvian bank. I empirically rule out several alternative explanations for the existence of the mutual fund excess return. First, I provide evidence that the difference in the riskiness composition of the assets between the institutions does not explain the excess return. Second, I test that its not explained bythe mutual fund behavior of investing systematically in riskier banks. Third, I verify that it is also not associated with the excess of returns that mutual it is not driven by difference in taxation regimes between mutual funds and banks.

The second part of the analysis explores the consequences on financial and bank stability of the mutual fund predominance in dollar savings. On one hand, I find that mutual funds reduce the amount of dollar savings within the domestic economy by 50%, which mitigates the risks associated with the accumulation of dollar savings on the economy and banks. On the other hand, mutual funds investments in dollar term deposits represent around 16.5% of the total of the domestic banking system[1], which expose local banks to large deposit withdrawals that might emerge as a consequence

[1]This significant share of mutual fund investment in banks is not specific to the context that I am studying. For the US, in June 2012, around 29% of the total investments of money market funds are allocated to certificates of deposits and 43% to financial commercial paper (see McCabe et al. (2012)). For the same period, for Hungary the deposits represented around 50% of their total investments and for Chile the investments on banks accounted for around 65%.

of the outflows originated by the redemptions that mutual funds face.

I exploit an exogenous source of variation to tease out the effects of mutual funds outflows on the stability of bank deposits and analyze the reaction of banks. The event that I explore is related with the political risk that emerged when a candidate, identified by the public opinion as an extreme-left politician, gained the top position in the poll preferences by advocating multiple measures that ran counter to the Peruvian economic and political fundamentals. Households reacted to the sudden shock by withdrawing around 11% of their mutual funds savings in dollars and 6% in local currency. I trace back the effects of this episode by looking at the withdrawals of the deposit instruments that mutual funds mainly rely on: they withdrawn around 4% of the total dollar term deposits of the banking system and only 0.14% in local currency. These magnitudes were much larger compared to other term deposits holders. Then, I analyze the bank response by looking at the change in loan rates and portfolio adjustments. Banks that were more exposed to mutual funds funding increased more their lending rates of dollar loans: an increase of 1% in the share that mutual funds represent out of the total dollar deposits is associated with an increase of dollar loans rates by 0.04%. The effect was more pronounced for small firms, which are the ones more exposed to exchange rate fluctuations. Regarding the effects on the portfolio adjustment, I found that dollar loans were not affected, but an increase of 1% dollar funding from mutual funds decreased by 0.05% the share invested in dollar financial instruments such as stock or bonds. Interestingly, I also observe in the time series a strong relationship between inflows of deposits from mutual funds and bank investments in dollar financial instruments.

I provide a simple theoretical model to illustrate how the ability of mutual funds to break the market segmentation of deposits generates in equilibrium the existence of a mutual fund dollar premium. In the model, from the demand side, households can save dollars either in banks or mutual funds by purchasing claims. They earn the same expected returns in both institutions, but the claims have different prices. From the supply side, banks issue domestic claims in an imperfect competitive market to invest in risky projects and are subject to regulatory and financing constraints. In contrast, mutual funds issue claims in a competitive market and, due to their conservative mandate that looks like a money market fund, they allocate their funds mainly in safe assets such as local and foreign bank dollar deposits and a small fraction in risky assets.

This document is related with three stands of the literature. First, a large body of academic research has been examining the motives behind the accumulation of dollar savings and debt as well as its consequences in emerging markets: Levy-Yeyati

(2006), Bocola and Lorenzoni (2020), Salomao and Varela (2022), Christiano, Dalgic, and Nurbekyan (2021), Gopinath and Stein (2021), Gutierrez, Ivashina, and Salomao (2023), among others. The contribution of this project to such literature is to explore a new source of dollar savings and its consequences for emerging markets. My theoretical framework builds and extends on Gopinath and Stein (2021) who model the bank production and the household problem of a representative emerging market. I contribute by introducing mutual funds as a source of dollar savings in the emerging economy equilibrium, by allowing imperfect competition in deposits, and by analyzing the impact of the break of the market segmentation on several equilibrium outcomes. A second set of related literature explores international portfolio allocations of institutional investors: Raddatz and Schmukler (2012), Raddatz, Schmukler, and Williams (2017), Affinito and Santioni (2021), Coppola et al. (2021), Camanho, Hau, and Rey (2022), Bacchetta, Van Wincoop, and Young (2023), Faia, Salomao, and Veghazy (2022), Florez-Orrego et al. (2023). Most of these evidence is either for the US or Europe. Instead, this document aims to provide evidence for a representative emerging market. Finally, there is a literature about the consequences of the raise of global non-banking financial intermediaries for emerging markets: Manconi, Massa, and Yasuda (2012), Cella, Ellul, and Giannetti (2013), Irani et al. (2021), Chari (2023). Differently to prior literature, this project explores the consequences of the predominance of a domestic non-banking financial intermediation instead of a global one.

This document is organized as follows: Section 2 shows a set of stylized facts regarding dollar savings and the importance of mutual funds. Section 3 develops a simple model to illustrate the main forces behind the household choice to save dollars among institutions and the existence of a mutual fund dollar premium in equilibrium. Section 4 provides a detailed description of the data sources. Section 5 documents empirically thoroughly the mutual fund premium and the relevance of the break of market segmentation channel. Section 6 explores the consequences of the predominance of mutual funds deposit holdings on the stability of domestic banks. Section 7 concludes. Detailed formal proofs are available in the Appendix.

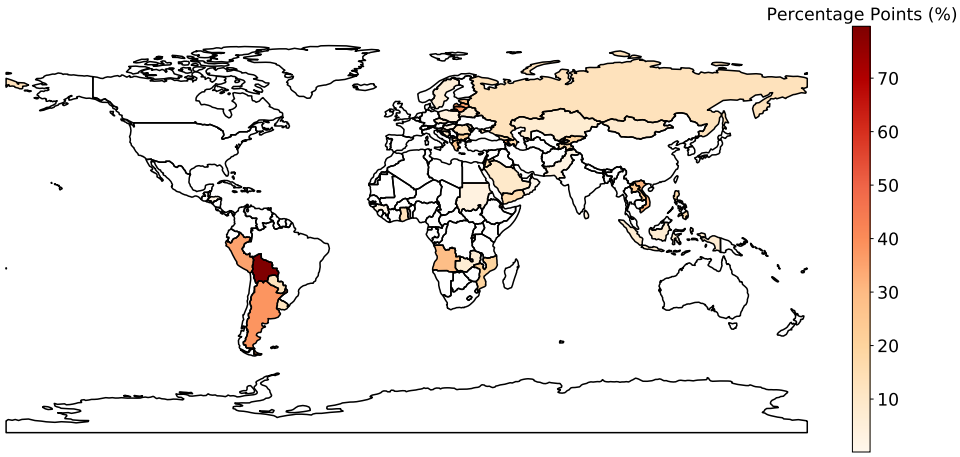
2 Dollar savings and the importance of mutual funds

The objective of this section is to show a clear picture of the dollarization of savings in emerging markets. I start by discussing already established facts about deposit de-dollarization and then I uncover some new facts about the importance of money market-like mutual funds. I complement the analysis using more granular data of a representative dollarized emerging economy, Peru.

2.1 Cross-country evidence

Dollarization of deposits has been going down for several years, especially for economies that had high levels of dollarization in the late 1990s. Figure 1 shows the evolution of deposit dollarization for several countries during 1999-2018 using the dataset of Levy-Yeyati (2021). Overall, this evidence might suggest that on average the economies are less exposed to financial risks associated with the dollar predominance in savings. However, we still need to understand the effects of the evolution of other relevant savings instruments.

Figure 1: De-dollarization of Bank Savings in Emerging Markets

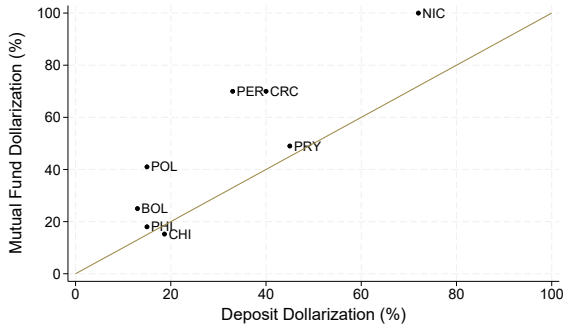


Note: Evolution of deposit de-dollarization measured as the differentials of deposit dollarization shares between 1999 and 2018 using the data from Levy-Yeyati (2021). The information includes countries that had at least 10% of deposit dollarization in 2000 and excludes offshore financial centers.

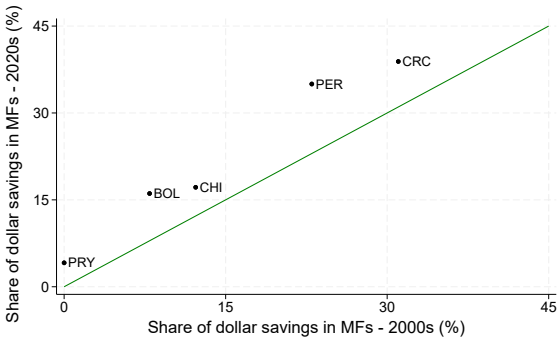
Another source for dollar savings in emerging markets that has not been examined in detail is mutual funds. Figure 2 - Panel A compares the dollarization of mutual funds with the dollarization of deposits and it shows that mutual fund dollarization is at least as larger than deposit dollarization. Additionally, Figure 2 - Panel B shows for a small sample that the share of dollar savings that mutual funds in dollars represent went from 18.5% to 26.8% between the early 2000s and 2020s.

Figure 2: Dollarization of Savings in Emerging Markets

(a) Dollarization of Mutual Funds and Deposits



(b) Evolution of the share that mutual funds in dollars represent of total dollar savings

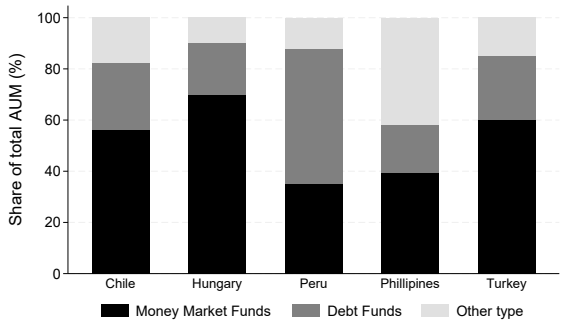


Note: Panel A compares the share of dollarization between banks and mutual funds for earliest 2020 for the country. Panel B compares the share that mutual funds in dollars represent out of total dollar savings in the earliest 2000 and 2020. The labels of the dots correspond to the ISO-3 country codes.

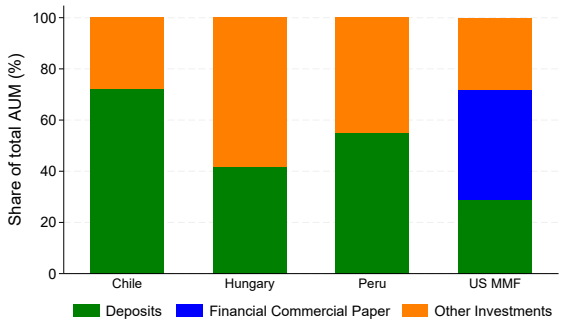
In contrast to develop countries, in emerging markets mutual funds are not predominantly equity funds. Figure 2 - Panel A displays the composition of mutual funds by type for a set of representative dollarized economies in 2012 and it shows that there is a significant share allocated in money market and debt funds. A notable characteristic of such type of mutual funds is their integration with the banking system. Figure 2 - Panel B displays the investment composition of mutual funds for a sample of emerging markets in 2012 and, on average, they allocate approximately 55% of their investments to bank deposits. Even for the US, the connection between money market funds and the financial system is strong. For the same year, 29% of the investments of money market funds were allocated to certificates of deposits and 43% to financial commercial paper (see McCabe et al. (2012)).

Figure 3: Mutual fund composition of representive dollarized emerging economies

(a) Type of Mutual Funds, 2012



(b) Mutual Fund Investments in Banks, 2012



Note: Panel A dissagregates mutual funds by type. Panel B shows the share that mutual funds invest in banks. I include statistics of the US money market fund. The sample is for 2012.

2.2 Detailed evidence from Peru

A small but representative survey conducted by the Peruvian financial regulator (SBS) named "*Encuesta Nacional de Capacidades Financieras 2019*" shows which income groups contribute the most to the dollar deposits in the economy. Table 1 displays that the saving in dollars comes almost equally from all income levels.

Regarding the type of saving instrument, deposit dollarization has being going down, while mutual fund dollarization going up. Figure 4 - Panel A shows the de-dollarization of deposits since 2001 and it holds for different deposit types.. This fact has been associated to the set of macro-prudential implemented in Peru especially after the global financial crisis (see for example Catão and Terrones (2016) or Gutierrez, Ivashina, and Salomao (2023) for a detailed timeline of the policy toolkit). In contrast, although mutual fund dollarization were closely tracking deposit dollarization, since 2014 mutual funds followed a different path, which was around the period in which a bulk of deposit de-dollarization policies were implemented. By the end of my sample, mutual fund dollarization was twice than deposit dollarization.

Table 1: Savers in different currencies across the income distribution

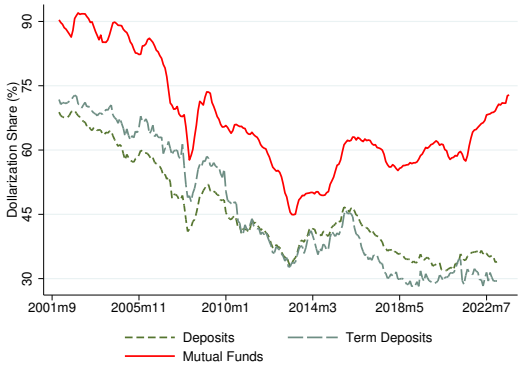
	% of households that save in dollars	% of households that save in local currency
Less than 1.2 times the average income	37.16	39.52
Between 1.2 to 2.4 times the average income	29.02	33.02
More than 2.4 times the average income	33.83	26.76

Note: Share of surveyed households that save in each currency across income levels in 2017

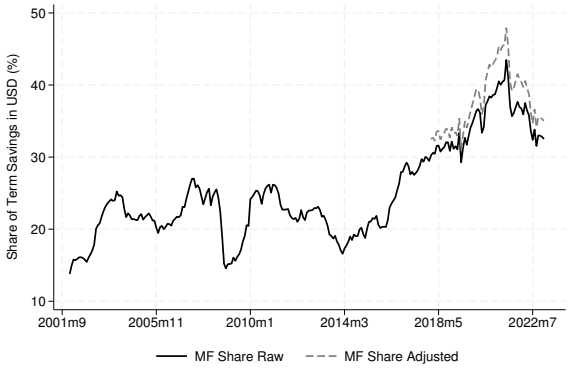
In addition, I measure the share that mutual fund in dollars represent out of the total dollar savings defined as the sum of dollar savings in mutual funds and bank term deposits. Figure 4 - Panel B shows that since 2014 there was a discernible uptrend in the relevance of mutual funds as a source of dollar savings, reaching a noteworthy level of around 40%. However, the previous measure will be a lower bound of the true magnitude of mutual funds in dollar savings because mutual funds invest in domestic bank deposits. For that reason, I exclude the deposits from mutual funds as part of the amount of bank deposits to avoid a double accounting[2]. The adjusted share is on average 4% higher than the raw share and mutual funds represented around 50% by the end of the sample.

Figure 4: Mutual Funds and Dollar Savings in Peru

(a) Deposits and Mutual Fund Dollarization



(b) Mutual Fund Share of Dollar Term Savings



Note: Panel A displays the dollarization evolution of deposits, term deposits, and mutual fund dollarization. Panel B plots two time series measures of the share that mutual funds represent out of the total dollar savings in Peru. The first measure is "MF share raw", which computes the ratio between the value of dollar savings in mutual funds with respect to the sum between dollar savings in mutual funds and banks. The second measure is "MF share adjusted", which corrects the "MF share raw" by excluding the dollar deposits of mutual funds in local banks. The analysis spans from 2001 to 2023.

3 Data Sources

In this section I provide a description of the main data sources.

[2]For instance, consider that mutual funds in dollars account for \$100 and local bank deposits in dollars for \$100, but \$50 dollars correspond to mutual fund deposits in local banks. The raw share will be 50% (\$100/[\$100+\$100]). In contrast, the adjusted share will avoid double accounting by excluding from the total the mutual fund deposits. The adjusted share will be 75% (\$100/[\$100+\$50]).

3.1 Cross-Country Information

First, I collected information about dollarization of bank deposits and mutual funds for several highly dollarized economies in the late 1990s. The source of deposit dollarization comes from Levy-Yeyati (2021), which has compiled an extensive dataset regarding dollar deposits in several countries from 1999 and 2018. Regarding information of mutual fund dollarization, I obtained the information from several mutual fund assocations and regulators of each country. Due to a lack of historical time series data, I gathered data from the latest available year.

Second, I obtained cross-country information from different central banks to measure the dollar term-deposit rates in different countries. For the US, I obtained deposit rates from Bankrate. For most of the countries the sample spans from 2018 to 2023 and the information is available in a monthly frequency.

Third, I compiled information of the Emerging Markets Bond Index Plus (EMBI+) provided by J.P Morgan to measure cross-country default risk, which I accessed through Bloomberg. The information is monthly and spans from 2018 to 2023.

3.2 Detailed Mutual Fund Information

I obtained a granular source of mutual fund information provided by the Peruvian regulator, *Superintendencia de Mercado, Valores y Valores (SMV)*. From this dataset, I observe with a monthly frequency the investment in main asset classes since 2014 and all the portfolio holdings for each fund since 2018. For each of the assets, the information displays the market value, the investment value, the asset prices, the returns, and the complete name of the depository institution or issuer and its address. The information of the depository name is novel and it allows me to track the country in which this fund has been allocated. For example, I can observe that a given mutual fund is investing in a subsidiary of a Brazilian bank located in New York. Additionally, I also exploit fund level information that contains the total net asset value, the currency of the fund, the financial statements, the price of one unit of the fund, and the return net of management fees.

3.3 Detailed Bank Level Information

The information is provided by the Peruvian financial regulator, *Superintendencia de Banca, Seguros, y AFPs* (SBS). This dataset provides information for each bank regarding the balance sheets, deposit rates and amounts for different saving maturities and currencies. Furthermore, I also can observe the average loan rates in each currency for corporate firms. Specifically, I obtained the average rates for firms classified

as "*Gran Empresa*" (those with sales greater than 20 million soles or about 6.5 million dollars and below to 200 million soles or about 65 million dollars) and "*Corporativos*" (those with sales above 200 million soles or about 65 million dollars). The frequency of the information is monthly, and it is available since 2010.

4 Mutual Fund Excess Return Evidence and Channel

In this section, I measure the excess returns that households obtain for saving dollars in mutual funds instead of banks. Additionally, I show that this fact is consistent with a theory about the break of the market segmentation of deposits. I rule out other potential explanations such as a traditional riskiness explanation.

4.1 Mutual Fund Excess Return for Dollar Savings

I define the mutual fund excess return as the difference between the return of mutual fund savings net of fees and the returns of bank term deposits. I compute the measure using a 12-month period of savings for each currency in Table 2. Households saving in dollars, on average, obtain annually a 1.73% net return for investing in mutual funds, but only a 1.29% return for saving in banks. This implies that households obtain an excess return of 0.42% for choosing mutual funds instead of banks. In contrast, I find the opposite effect for savings in local currency: the returns of deposits in local currency were 4.12%, but only 3.20% for mutual funds, which implies a discount of 0.92% for their local currency savings in mutual funds. In that sense, the excess return is a phenomenon specific to dollar savings and it is not necessarily associated to the investment skill of mutual funds or a compensation for risk.

Table 2: Average mutual fund premium for 12-month savings, 2010-2023

Currency	**MF returns net of fees**, r_h^{mf}	**Bank returns**, r_h^{bank}	**MF excess return**, $r_h^{mf} - r_h^{bank}$
Dollars	1.73%	1.29%	+0.42%
Soles	3.20%	4.12%	-0.92%

Note: This table displays the average mutual fund excess return across currencies. The second column shows the average mutual fund returns net of fees, while the third the bank returns for a period of 12 months. Finally, in the third column I display the differential between both measures. The period of analysis spans from 2010 to 2023.

The empirical evidence is robust to alternative periods of analysis and across time. First, the pattern is still significant if we consider alternative saving periods. For instance, for a 6-month period of dollar savings, the magnitudes are around 0.25% semiannual return, while for local currency the discount remains negative. Second, the dollar excess return is also persistent over time. Figure 5 shows that during 2010-

2022 more than 65% of the time the mutual fund dollar excess return was positive. Instead, for savings in local currency there is a persistent discounts over time

Figure 5: Mutual Fund Excess Return over Deposits

(a) Annual Premium of Dollar Savings in Mutual Funds Funds

(b) Annual Premium of Domestic Currency Savings in Mutual Funds Savings

Note: This figure depicts the time series of the annual net excess return for saving in mutual funds instead of banks. Panel A plots the information for savings in dollars, while Panel B for savings in local currency (soles). The main period of analysis spans from 2010 to 2022.

4.2 The Break of Market Segmentation Channel

Traditionally, due to regulations, households savings in emerging markets were restricted by the conditions of the local market for bank deposits as this was the predominant alternative for allocating their funds. Instead, with the existence of mutual funds there was a break of the traditional market segmentation as households savings potentially can be invested almost everywhere, including banks in other countries. In this subsection, I explore a theory about the break of the local market segmentation of deposits, which I define as the ability of domestic mutual funds to optimize their portfolios by investing in deposits in foreign countries, as a potential explanation for the existence of the mutual fund excess returns for dollar savings.

4.2.1 Mutual Funds Investment Abroad

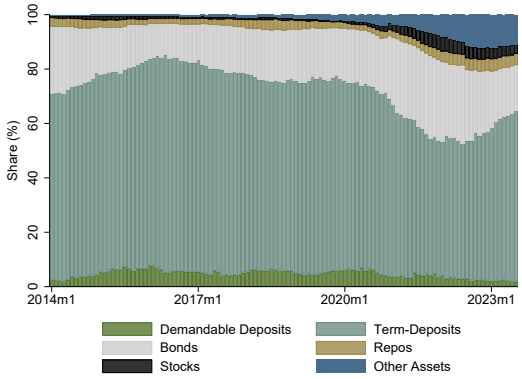
A necessary condition for the theory relevance is that mutual funds invest heavily abroad. I focus the analysis on term-deposits, as they represent around 75% of their total investments as shown in Figure 6 - Panel A. Using the name and location of the depository institution for each portfolio holding, I identify the destination of the funds and I divide the countries into three destination categories: domestic country, foreign country with USD as its official currency, and foreign country without USD as its official currency. Figure 6 - Panel B shows the deposit investment shares across the

main categories. and there is a considerable break in the local market segmentation of deposits as 65% of their deposits are invested abroad. Although it would be expected that mutual funds invest abroad, we would not necessarily expect it to be too large, considering the phenomenon of portfolio home bias.

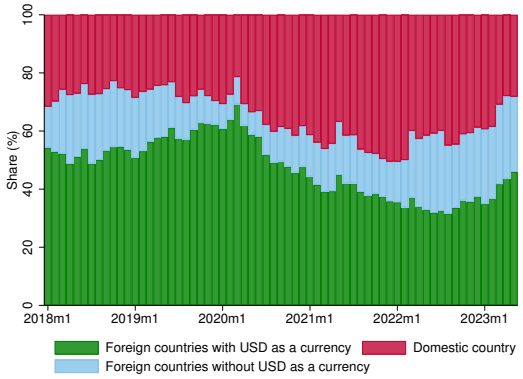
The large allocation of mutual funds in foreign countries has important implications for financial stability. The previous magnitudes imply that at least 50% of the Peruvian dollar savings in mutual funds flow out of the country. As a result, the presence of mutual funds has a positive effect on domestic financial stability because it lowers the dollarization volume within the country, which mitigates potential country or bank exchange rate risk. In contrast, mutual funds are exporting dollarization to countries that do not use the dollar as their official currency. Around 15% of their dollar portfolio invested in deposits is allocated to countries that does not have the USD as their official currency. For instance, a Peruvian mutual funds invest in Chilean banks, which make Chile more exposed to dollarization risks.

Figure 6: Investment Composition of Mutual Funds in Dollars

(a) Asset Class Riskiness Composition



(b) Composition of mutual funds' term deposits in dollars across locations



Note: This graph displays the investment composition of mutual funds in dollars across countries and asset class. Panel A dissects their investments in term deposits across three categories of countries: domestic country, foreign countries with and without the dollar as its primary currency. Panel B displays all the asset classes in which mutual funds invest. The period of analysis spans from 2018 to 2023.

4.2.2 Mutual Funds Investment Abroad

I provide a simple example of how mutual funds can obtain a premium by investing in deposits abroad by comparing the returns that an average household get in Peru compared to what households obtain in the countries where mutual funds allocate their funds. For simplicity, I use bank deposit rates for 12-month savings across

three major destinations: Chile, Panama and the US, which jointly account for 55% of the total investment of mutual funds in foreign term deposits. Table 3 shows that during 2018-2023, the average dollar deposit rates in Chile, Panama and the US was 2.2%, 2.9%, and 0.6% respectively, while Peruvian dollar deposit rates were around 1.4%. Considering these magnitudes, mutual funds might obtain a positive premium if they invest in Panama or Chile and a discount if they allocate funds in the US. Therefore, in absence of frictions, mutual funds can make a profit by investing in other countries. For instance, if they invest 70% in Panama and 30% in the US they would get a positive premium of around 0.8%.

Besides only documenting that there exists significant dollar deposits rates differential across countries, using the theoretically framework, the differential can be decomposed as follows:

$$r^F_\$ - r^H_\$ \simeq \underbrace{1/\eta^H_\$ - 1/\eta^F_\$}_{Demnad\ Elasticity\ Differentials} + \underbrace{\varphi^H_\$ \bar{\varepsilon}^H - \varphi^F_\$ \bar{\varepsilon}^F}_{Regulatory\ Differentials} + \underbrace{\beta^H - \beta^F}_{Discount\ Factor\ Differentials} \tag{1}$$

According to equation 1, a factor potentially driving the differences in dollar deposit returns between countries is the shadow values of the regulations, $\varphi^H_\$ \bar{\varepsilon}^H$ and $\varphi^F_\$ \bar{\varepsilon}^F$. However, as the regulatory landscapes are similar across countries in the sample, this is probably not the main explanation of the differential (see for example Tobal (2019) or Levy-Yeyati (2021)). Another driver that might affecting the differential are discount factors, however as the countries in the sample are emerging economies in Latin America it does not seem the case that the have significant differences in their discount factors. Finally, a factor that also pushes the returns differential is the difference in demand elasticities, $\eta^F_\$$, and $\eta^H_\$$. In a more complex model, we can also include country risk differentialsas a reason of the differentials might be that the foreign country is riskier than the domestic country. However, this does not seem to be the case. Table 3 shows that country risks differential are not too different.

Table 3: Cross-country dollar investment premium for major destinations, 2018-2023

Country	12-month dollar rates		Country risk	
	Deposits	Premium	Differential	Adjusted premium
	$r^{bank}_{h,c}$	$r^{bank}_{h,c} - r^{bank}_{h,PER}$	$\delta_{h,c} - \delta_{h,PER}$	$r^{bank}_{h,c} - r^{bank}_{h,PER} - (\delta_{h,c} - \delta_{h,PER})$
Chile	2.2%	+0.8%	-0.1%	+0.9%
Panama	2.9%	+1.5%	0.2%	+1.3%
US	0.6%	-0.8%	-1.6%	+0.8%

Note: This table displays the annual returns for dollar deposits across the major investment destinations of mutual funds using the local dollar deposit rates of each country. The second and third columns show the dollar deposit rates and the premium over the Peruvian dollar deposit rates. The last two columns display the country risk differentials and the premium adjusted by country risk differentials. The period of analysis spans from 2018 to 2023.

4.2.3 Mutual Fund Realized Gains For Investing Abroad

Although I have shown that potentially a domestic household might obtain higher dollar returns by allocating their deposits abroad, it should be the case that mutual funds in fact are obtaining a premium for their investments abroad. To assess the gains from allocating funds into deposits abroad, I compute the average observed returns that mutual funds get from their deposits in foreign countries and I construct a counterfactual return that represents what an individual investor would get if they would have allocated the same funds with the same maturity in the domestic country.

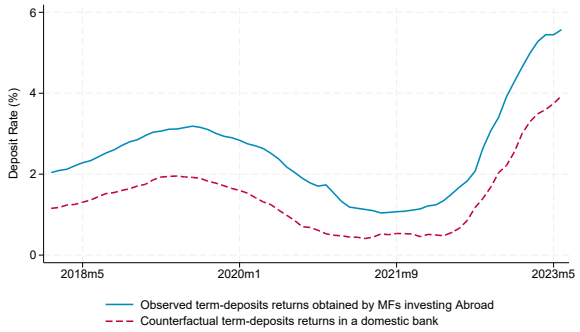
$$r^{observed\ foreign}_{MFs,t} \equiv \sum_{d} \omega^{observed\ foreign}_{MFs,d,m,t} \times r^{observed\ foreign}_{MFs,d,m,t}$$

$$r^{counterfactual\ foreign}_{MFs,t} \equiv \sum_{d} \omega^{observed\ foreign}_{MFs,d,m,t} \times r^{local}_{MFs,d,m,t}$$

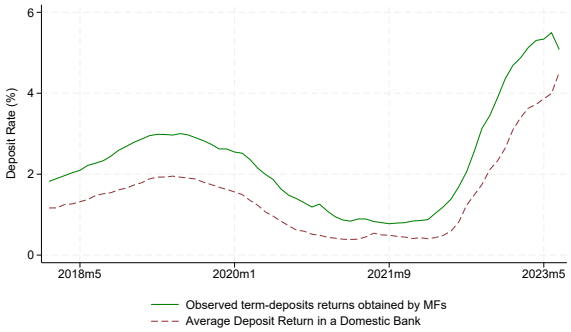
where $r^{observed\ foreign}_{MFs,t}$ is the average dollar deposit rates that mutual funds obtain for their investments abroad at time t, $\omega^{observed\ foreign}_{MFs,d,m,t}$ is the share that deposit d with maturity m at time t for mutual funds, $r^{observed\ foreign}_{MFs,d,m,t}$ is the dollar rate of deposit d with maturity m at time t, $r^{counterfactual\ foreign}_{MFs,t}$ is a counterfactual dollar deposit rate that represent what mutual funds would have obtained if they would have allocated their funds in the domestic country at time t, $r^{local}_{MFs,d,m,t}$ is the dollar rate in the local market for a deposit with maturity m at time t. Figure 7 - Panel A shows $r^{observed\ foreign}_{MFs,t}$ and $r^{synthetic\ foreign}_{MFs,t}$.

Figure 7: Return of Mutual Funds Deposits vs Counterfactual Domestic Bank Return Across Locations

(a) Return of MF foreign deposits in dollars against domestic bank return



(b) Return of MF deposits in dollars against average domestic bank return



Note: This graph displays the comparison between the return in dollar term deposits that mutual funds obtain with a counterfactual deposit rate of a local bank. I construct the counterfactual rate by matching the same maturity of the mutual fund deposit and computing the corresponding deposit rate in the local market. Panel A plots the returns of dollar deposits of mutual investments abroad and the counterfactual domestic rate, while Panel B shows the comparison for mutual investments in domestic banks and its corresponding counterfactual domestic rate. The period of analysis spans from 2018 to 2023.

Mutual funds earn, on average, 1.1%[3] more by investing abroad than in the local market and this differential is persistent across time. Additionally, I extend the previous calculation to include all the portfolio deposits besides only the foreign ones. Figure 7 - Panel B displays the comparison between the total observed return across all the dollar deposit investments of mutual funds and the average dollar deposit in domestic bank. The deposit investments of mutual funds earn, on average, 0.9% more than domestic banks and this differential is also persistent.

4.2.4 Portfolio Flows Across Countries

Another implication of the theory of break of market segmentation is that if mutual funds are significantly allocating their portfolios abroad, they should optimally allocate their funds across foreign countries. I test whether mutual funds respond to changes in returns by estimating a regression between the logarithm of the investment share in country c and time t against the returns of deposits that mutual funds get from such destination 6 months before (see equation 2). Additionally, I estimate

[3]Note that this measure serves as a conservative estimate, representing a lower bound of potential returns for mutual funds investing all their foreign funds into local deposits. In a general equilibrium scenario, a substantial inflow of dollar deposits could exert downward pressure on local interest rates.

an analogous fund-country-time level regression (see equation 3).

$$ln\left(s_{c,t}\right) = \beta_1 \cdot r_{c,t-6} + \eta_c + \eta_t + \epsilon_{c,t} \tag{2}$$

$$ln\left(s_{f,c,t}\right) = \beta_2 \cdot r_{f,c,t-6} + \eta_{c,t} + \eta_{f,t} + \eta_{f,c} + v_{f,c,t} \tag{3}$$

where $s_{c,t}$ represents the total share invested in country c at period t, $s_{f,c,t}$ denotes the share invested by fund f in country c at period t, $r_{c,t-6}$ is the return for term-deposits in country c at $t-6$, $r_{f,c,t-6}$ is the return for term-deposits of fund f in country c at $t-6$, η_c is a country fixed effect, η_t is a time fixed effect, $\eta_{c,t}$ is a country-time fixed effect, $\eta_{f,t}$ is a firm-time fixed effect, and $\eta_{f,c}$ is a mutual fund-country fixed effect.

Table 4 displays the results. The magnitudes indicate that an increase of 1% in a returns of deposits of a given foreign country predicts between 0.24%-0.357% higher investment share. The results at the fund level also corroborate the relationship and the implied higher investment share by a fund is around 0.116%-0.211%.

Table 4: MFs foreign term-deposit allocation and returns

	$ln\left(s_{c,t}\right)$		$ln\left(s_{f,c,t}\right)$	
	(1)	*(2)*	*(3)*	*(4)*
$r_{c,t-6}$	0.357***			
$r_{c,t-6} - r^{counterfactual\ domestic}_{MFs,t-6}$		0.239***		
$r_{f,c,t-6}$			0.211***	
$r_{f,c,t-6} - r^{counterfactual\ domestic}_{f,t-6}$				0.116***
Time FE	Yes	Yes	No	No
Country FE	Yes	Yes	No	No
Fund-Time FE	No	No	Yes	Yes
Fund-Country FE	No	No	Yes	Yes
Country-Time FE	No	No	Yes	Yes
R-squared	0.83	0.83	0.72	0.72
Observations	623	623	3,863	3,863

Note: This table shows the relationship between the logarithm of the share invested of mutual funds in each country and returns measures. Columns (1) displays the association at the aggregate level using the average dollar deposit returns of a given country six months before. Column (2) replicates the analysis, but considering the excess of returns over the counterfactual dollar deposit rate in the domestic country. Column (3) and (4) extends the analysis at the mutual fund-country-time level. The period of analysis spans from 2018 to 2023.

4.3 Alternative Explanations of Mutual Fund Excess Return

4.3.1 The Asset Class Riskiness Channel

A potential explanation of the mutual fund dollar excess return is the riskiness of the asset class in which they invest. The idea is that mutual funds should obtain a premium over banks given that they can invest in riskier assets such as stocks. However, this does not seem a likely explanation for two reasons: First, if we look at the performance of mutual funds in local currency, we would expect them to earn a positive risk premium due to their diversification of asset classes, but mutual funds are getting a discount. Second, mutual funds in dollars are mainly investing in deposits and not in riskier assets. As Figure 6 - Panel A showed, deposits account for 75%-80%[4] and fixed-income assets around 95%.

4.3.2 The Unsecured Deposit Riskiness Channel

An alternative reason for the existence of the excess return is the riskiness of uninsured savings: banks provide deposit insurance, while mutual funds do not[5]. For that reason, households might earn a premium for holding mutual funds as they are riskier than banks. To test the uninsured deposit premium explanation, I compute a differential measure between the rates in the domestic market that mutual funds get for their (uninsured) deposits and the rate than an average (insured) household gets for a deposit with similar maturity[6]. Figure 8 shows that this differential is around 0.48% for dollar deposits and 0.20% for deposits in local currency. Although these magnitudes seem close to the excess return, such measures are gross returns while the excess return is a net return obtained after deducting fees. On average, mutual funds charge over 0.5%, which implies that after accounting for fees the additional return that a household might get for holding an unsecured saving is not able to explain the mutual fund net excess return.

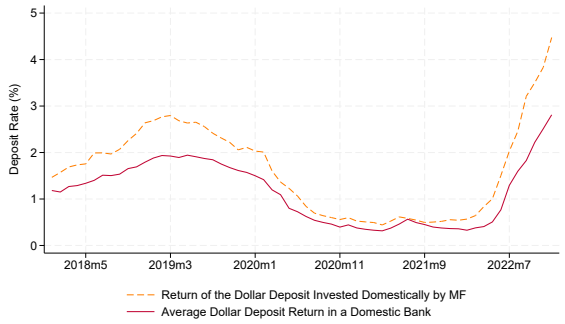
[4]Note that in the event of significant, unforeseen outflows, demandable deposits represent only 5% of the portfolio. Consequently, there might be a necessity to liquidate other assets, potentially impacting financial stability. Overall, it seems unlikely to argue that mutual funds are getting a dollar premium because they are investing in riskier assets than banks.

[5]Households that save in Peruvian banks are insured if they have less than 100,000 soles (around 27,000 dollars) in their total banking savings accounts. In contrast, mutual funds do not offer direct insurance to households and mutual funds deposits might not be fully insured as they invest large amounts. In my sample, around 100% of the mutual fund investments in Peruvian banks were uninsured. Similarly, almost all their deposits in foreign countries are fully uninsured. Also, countries like Panama did not offer deposit insurance through the length of my sample.

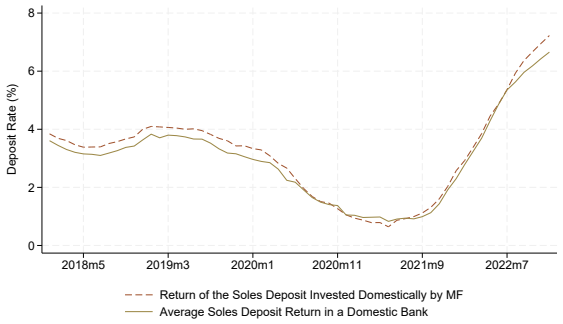
[6]This measure can be interpreted as an upper bound of the uninsured premium as this differential combines the compensation of local banks to mutual funds for allocating a large amount of deposits and a potential compensation for being uninsured.

Figure 8: Unsecured vs Average Deposit Rates: Unsecured Premium

(a) Return of MF deposits in dollars within the country compared to domestic bank returns



(b) Return of MF deposits in domestic currency deposits compared to average returns



Note: This figure shows a comparison between the return in deposits that mutual funds obtain in the domestic economy with the a comparable deposit rate of a local bank. The difference between both lines aims to capture the excess of returns for holding unsecured deposit. Panel A plots the information for deposits in dollars, while Panel B for deposits in local currency (soles). The information spans from 2018 to 2022.

4.3.3 The Bank Riskiness Channel

Another possible reason behind the excess return is that mutual funds might be investing in riskier banks, which might have incentives to pay higher returns to attract clients and avoid default (as Egan, Hortaçsu, and Matvos (2017) studied for the US). I explore two pieces of evidence that rules out this hypothesis. First, less than 1% of the banks in which mutual funds invested went bankrupt or no longer operate. Second, using a measure of bank risk classification, I find that around 71% of the banks in which mutual funds allocate their funds have a category of investment grade (BBB or higher) according to the Standard and Poors (S&P) rating system. During the same period of analysis, the four largest Peruvian banks that account for around 85% of the deposit market were classified with BBB. In that sense, the composition of bank risk for mutual fund investments is not too different than the one in the domestic market. Additionally, I compare the average rates paid by the banks classified as high-yield (BB+ or lower) with those with an investment grade (BBB or higher), and the difference between them accounts for 0.5%. Once I adjust this gross return using fees, the gain from investing in riskier banks disappears, which implies that it do not explain the mutual fund excess return either.

4.3.4 The Taxation Channel

The difference in taxation rules between banks and mutual funds might explain the existence of an excess return in equilibrium. Households investing in mutual

funds are required to tax a 5% of all their capital gains if they are above a given income taxation level, while bank deposits do not pay taxes. Also, Peruvian individuals are only taxed if they have a net annual income that accounts for at least 34,650 soles (around 10,000 dollars), which is above the average income of an individual of a Peruvian household (around 3,500 dollars) and it implies that some households might not be taxed for their mutual fund investments. Overall the taxation regime diminishes the appeal to invest in mutual funds compared to banks, which suggest that taxation is unlikely to be the primary determinant behind the significant share of observed savings of mutual funds in dollars. Regarding the excess return, even after accounting for taxation, the magnitude is still positive and around 0.33%, which implies that it is not explained by taxes.

5 Mutual Funds and Domestic Bank Stability

In this section, I explore the consequences of the predominance of mutual funds deposit holdings on the stability of domestic banks. The traditional understanding about term-deposits is that they are very sticky (stable). However, mutual funds are different agents and might find optimal to move their deposits in the domestic market due to redemption risk or new investment opportunities abroad, which will affect the stability of domestic banks.

5.1 Mutual Fund Relevance on Domestic Bank Deposits

To make a relevant argument about the effect of mutual funds on domestic banks, they should represent a significant share of their deposits. Table 5 shows the size of mutual fund term deposits with respect to the total value of term deposits and also to the total deposits of Peruvian banks by currency. At the aggregate level, mutual funds represent 16% of the total dollar term-deposits of the local banking system and across all types of dollar deposits around 5%. In contrast, the magnitudes for local currency deposits are almost the half than for dollars. At the bank level, there is significant cross-sectional variation: For the median bank, the deposits from mutual funds represent around 16.5% of its total dollar term-deposits and 4.7% of their total dollar deposits. For the ones above the 90th percentile, mutual funds represent at least 23% of their dollar term-deposits and 13% of the total dollar deposits, while the banks below the 10th percentile do not receive any dollar deposits from mutual funds. Similar than the aggregate share, the magnitudes for domestic deposits are almost half than the ones for dollar deposits.

Table 5: MFs participation in bank's dollar deposits - 2019

	Dollar Deposits		Domestic Currency Deposits	
	% of term deposits	% of all deposits	% of term deposits	% of all deposits
Share at the aggregate level	16.31%	4.90%	8.60%	2.60%
Share at the bank level				
Median	16.53%	4.71%	5.78%	2.82%
Mean	12.17%	5.47%	7.52%	4.03%
10th Percentile	0%	0%	0%	0%
90th Percentile	22.86%	12.98%	13.28%	6.95%

Note: This table shows the relative magnitude of mutual fund deposits on domestic banks. The statistics are split among currencies and type of deposits: term-deposits or total deposits. The first row presents the information at the aggregate level by measuring with respect to the type of deposit of the banking system, while the second row and below computes the information at the bank level. The period of analysis is December 2019.

5.2 Mutual Fund Holdings Volatility and Deposit Stickiness

Although mutual funds have significant dollar deposits in banks, it does not necessarily mean that they are affecting the steadiness of deposits as they might be allocating an stable amount of resources to banks. Moreover, the traditional understanding is that term-deposits are very sticky. For that reason, I explore the variability of the deposit holdings of mutual funds. Table 6 shows descriptive statistics of the monthly term deposit growth across currency, holding agent, and investment location of the mutual funds. Term deposits in dollars are more than two times volatile than in local currency: the 10th and 90th percentiles are between -6.61 and 5.82 for dollar term deposits while for local currency are only between -2.27 and 2.80. The magnitudes of the standard deviation also confirm this result. The statistics by type of agent shows that, with 90% confidence, the deposit growth rates of mutual funds lie between -12% to 12%, while for other agents this range is the half. This volatile holding behavior of mutual funds extends to the domestic and foreign markets.

Table 6: Deposit Growth Variability (measured in %)

	Domestic Deposits by Currency		**Dollar Deposits by Holder**		**MFs Holdings by Location**	
	Local	*Dollar*	*Other Agents*	*MFs*	*Domestic*	*Foreign*
Standard Deviation	2.23	5.89	6.06	10.84	10.84	7.12
10th Percentile	-2.27	-6.61	-6.05	-12.69	-12.69	-8.81
25th Percentile	-1.02	-2.08	-2.75	-5.93	-5.93	-3.55
75th Percentile	1.82	3.09	3.11	7.15	7.15	3.42
90th Percentile	2.80	5.82	5.47	11.86	11.86	8.9

Note: This table displays the variability of the monthly deposit growth (measured in %). The statistics are split among currencies (local currency or dollar), holding agent (mutual funds or other agents), investment location of mutual funds (domestic or foreign country). The first row presents the standard deviation of the monthly deposit growth, while the second row and below compute several percentiles of the monthly deposit growth. The period of analysis spans from 2018 to 2023.

5.3 Mutual Fund Outflows and Bank Response

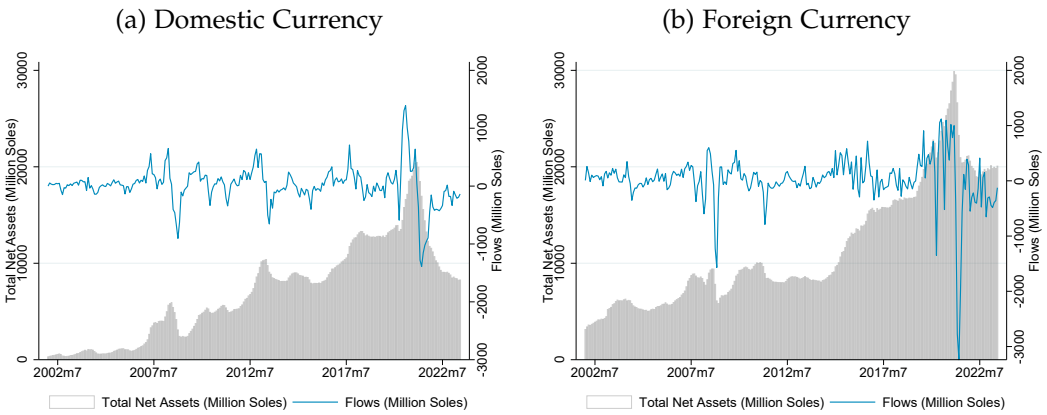
5.3.1 Event Study

I exploit a quasi-random variation in household's withdrawals of their mutual funds savings to tease out the effects of mutual funds on banks. During the election year of 2021 in Peru, a candidate considered as an extreme-left politician was first in the poll preferences. He proposed several measures that were against the economic fundamentals established since the early 1990s. Some of the concerns were related to the thread of nationalizations[7] of strategic industries and with the fact that the Peruvian economy will follow a similar path than Venezuela[8].

[7]He proposed a "more muscular" state and the "nationalization" of strategic sectors of the economy such as mining and gas." (see the following Reuters article for more details: https://www.reuters.com/world/peru-presidential-candidates-mining-economy-2021-06-03/)

[8]The concerns were too predominant in the public opinion that he repetitive mentioned close to the election date the following: "we are not Chavistas, we are not communists, we are not extremists". As described by Reuters: "he had at times during the election campaign threatened nationalizations, though recently (to the election date) he has softened his rhetoric, bringing more moderate advisers into his inner circle and pledging to respect private property and investment."

Figure 9: Total Net Assets (TNA) and Aggregate Flows



Note: This picture displays the evolution of the value of total net assets and aggregate flows of Peruvian mutual funds. Panel A plots the information for deposits in dollars, while Panel B for deposits in local currency (soles). The period of analysis spans from 2002 to 2023.

5.3.2 Households Reaction to the Episode

Due to the political risk during the event study, households reacted by withdrawing around 11% of their mutual funds savings in dollars and 6% in local currency. Figure 9 shows the evolution of the total net assets and the net outflows of the mutual funds in dollars[9] and in local currency (soles). Since 2002 there were two significant periods of outflows: during the financial crisis of 2008 and around May 2021 (just days before the election date), but by far the largest one was during the election period of 2021. Importantly, outflows were meaningful for mutual funds in dollars, and the magnitudes were around three times than in local currency. The withdrawal is consistent with an increase in the volatility of mutual funds returns or in the preference for liquid assets due to the political shock[10].

[9]For comparability, I am measuring both outflows and total net assets in local currency. However, the pattern for mutual fund dollars during the event is even more striking if its measured in dollars. If anything, converting dollar amounts into local currency is reducing the magnitude because the exchange rate after the event was higher: the size of the outflows with respect to the total net assets of mutual funds in dollars was around 11% at the time of the event, while converting the amounts into local currency first yields a 9.4% outflow.

[10]Note that this phenomenon is different than the traditional currency composition shock that has been usually associated with political risk events. The idea of such mechanism is that political shocks generate a positive shift for dollar-denominated assets, but a negative one for the assets in local currency. In the political event that I am exploring, the main feature is that households reacted by withdrawing their dollar term savings instead of using their local currency savings and convert them into dollar savings.

5.3.3 Impact on Bank's Deposits

I test the impact on bank's deposits stability by evaluating the effects on the deposit type that mutual funds mainly rely on: term deposits with less than 1 year, which represent more than 90%. I compute at the time of the event the term deposit outflows relative to the total banking term deposits one month before the shock. Mutual funds withdrew around of 4% of the total dollar term deposits of the banking system, while other agents[11] only 3.1%. As mutual fund outflows were mainly for dollar savings, we should not expect a significant withdrawal of local currency deposits. Indeed, withdrawals in local currency by mutual funds represented only 0.4% of the total term-deposits.

5.3.4 Impact on Bank's Rates

Considering the event study, I exploit the cross-sectional variation of bank exposure to mutual funds by comparing the response of banks that were more exposed to mutual funds and those who were not. I compute the share that mutual funds represent out of each bank total term deposits and I use the median across banks as a cut-off to define which banks belong to each group. I measure it by the end of the year before the shock to avoid any mechanical effect. The average share of total term deposits for exposed banks is 22.4%, while for non-exposed banks is 5.8%. As the main source of income for banks is loans, I will start by testing whether banks that were more exposed to mutual funds funding shocks increased more their loan pricing compared to those who were not:

$$r_{b,t}^{dollars} = \alpha \cdot Exposed\ to\ MFs_b^{dollars} \cdot Post_t + \zeta_b + \zeta_t + \epsilon_{b,t}$$

where $r_{b,t}^{dollars}$ represents the average rate of dollar loans of bank b at period t, $Exposed\ to\ MFs_b^{dollars}$ is a dummy that denotes whether, one year previous to the shock, the share of term-deposit in dollars from mutual funds over total term-deposits for bank b was above the median, and $Post_t$ is a dummy that takes the value of one after the shock (May 2021). Table 7 shows the results.

[11] As there are no other main alternative saving options for Peruvian households besides allocating them through mutual funds or banks, the funds withdrawn from mutual funds were probably directly converted into demandable deposits. However, this implication its difficult to test during the event window mainly because of the lack of granular data about household holdings. An alternative approach will be to look at the aggregate or bank level evolution of demandable deposits, but many other forces might be affecting its the trend, which makes it hard to think about a counterfactual. For instance, Peruvian multinational companies can be withdrawing their funds from current accounts to invest in operations in other countries to mitigate their exposures to the risk.

Table 7: Change of dollar interest rate after a political shock

	Loan rates in dollars			**Loan rates in soles (placebo)**		
	All corporates	Large	Small	All corporates	Large	Small
$Exposed\ to\ MFs_b \times Post_t$	0.69**	0.47	0.56**	0.02	-0.05	-0.59
	(2.82)	(1.51)	(2.42)	(0.07)	(-0.18)	(-0.08)
Firm Type-Time FE	Yes	No	No	Yes	No	No
Time FE	No	Yes	Yes	No	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	234	113	121	205	98	107

Note: This table test whether banks that were more exposed to mutual funds funding shocks increased more their corproate loan pricing compared to those who were not. The dependent variable is $r_{b,t}^{dollars}$ which represents the average rate of dollar loans (in percentage points) of bank b at period t. $Exposed\ to\ MFs_b^{dollars}$ is a dummy that denotes whether, one year previous to the shock, the share of term-deposit in dollars from mutual funds over total term-deposits for b was above the median, and $Post_t$ is a dummy that takes the value of one after the shock of May 2021. The regression results are splitted by currency (dollars or local currency) and size of firms (large or small). The frequency of the data is monthly and the window of the analysis is 2021.

Banks that were more funded by mutual funds (more exposed) increased their lending rates of dollar loans by in 0.69% more than those who do not. Alternatively, we can also interpret the effects using the magnitudes of the measures of term deposit shares[12]: an increase of 1% in the share that mutual funds represent out of the total dollar deposits is associated with an increase of dollar loans rates by 0.04%. In terms of the effect across firm size, the impact was especially pronounced for small firms, which are more exposed to exchange rate risk.

Although I use an exogenous supply shock for banks, it could be the case that demand factors might be driving the result through the matching between banks and firms. For instance, consider the case in which less deposit stable banks lend to borrowers that are more dependent on the local economy. In such a case, we should expect higher lending rates for banks with less stable deposits even in absence of any mutual fund withdrawal effect because, due to the political shock, firms that rely more on the local economy were more riskier after the event. If the composition of borrowers within less stable banks will be explaining the results we should expect to see higher interest rates not only for dollars, but also for the local currency. More generally, as in this case the treatment is only for dollar deposits, we can use the effect on the local currency as a placebo test. According to Table 7, after the shock there was

[12]The exposed group to mutual fund funding accounted for 22.4% of its term deposits and increased their rates by 0.69% compared to the non-exposed group for which mutual funds represented 5.8% of their term deposits, which suggests that, on average, there was an impact of 0.04% (0.69%/[22.4%-5.8%])

no difference between the increase of interest rates in local currency between more exposed banks and less exposed banks, which provides suggestive evidence that the matching composition might not be driving the results.

5.3.5 Impact on Bank's Portfolio

I also analyze the effect on the dollar portfolio of banks such as dollar loans and investments in dollar financial instruments such as bonds or stocks. I estimate a similar specification as before, but modifying the dependent variable to be the share that each of the asset types represent out of the total dollar assets of each bank:

$$s_{j,b,t}^{dollars} = \alpha \cdot Exposed\ to\ MFs_{b}^{dollars} \cdot Post_t + \zeta_b + \zeta_t + \epsilon_{b,t}$$

where $s_{j,b,t}^{dollars}$ represents the share that asset type j represent out of the total dollar assets of bank b at period t. Table 8 shows the results. Compared to those who were not exposed, banks that were more funded by mutual funds (more exposed) did not significantly decreased their dollar corporate lending. However, they do significantly decreased their share invested in dollar financial instruments by 0.78%, which implies that an increase of 1% in the share that mutual funds represent out of the total dollar deposits is associated with an increase of the share that investments in dollar financial instruments represent out of total assets by 0.05%. This relationship is strong and its also present in the time series. From an stability point of view, this behavior might exacerbate asset fire sales in security markets.

Table 8: Change of dollar portfolio after a political shock

This table test how do banks that were more exposed to mutual funds funding shocks adjusted their dollar portfolio compared to those who were not. The dependent variable is defined at the top of each column. $Loan_{b,t}^{dollars}$ is the total amount of dollar loans of bank b at time t, $Assets_{b,t}^{dollars}$ is the total amount of dollar assets of bank b at time t, $Financial\ Instruments_{b,t}^{dollars}$ is the total investment in financial instruments in dollars. $Exposed\ to\ MFs_{b}^{dollars}$ is a dummy that denotes whether, at the end of the year previous to the shock, the share of term-deposit in dollars from mutual funds over total term-deposits for b was above the median, and $Post_t$ is a dummy that takes the value of one after the shock of May 2021. $Deposits\ MF_{bt}$ denotes the total value of term-deposits of mutual funds in bank b at time t. The first fourth columns of results display the results of the event study, while the last two columns show the correlation for the full panel dataset. The effects frequency of the data is monthly and the window of the analysis is 2021.

	Event Study				**Panel Dataset**	
	$\frac{Loan_{b,t}^{dollars}}{Assets_{b,t}^{dollars}}$	$ln\left(\frac{Loan_{b,t}^{dollars}}{Assets_{b,t}^{dollars}}\right)$	$\frac{Financial\ Instruments_{b,t}^{dollars}}{Assets_{b,t}^{dollars}}$	$ln\left(1+\frac{Financial\ Instruments_{b,t}^{dollars}}{Assets_{b,t}^{dollars}}\right)$	$\frac{Loan_{b,t}^{dollars}}{Assets_{b,t}^{dollars}}$	$\frac{Financial\ Instruments_{b,t}^{dollars}}{Assets_{b,t}^{dollars}}$
$Exposed\ to\ MFs_b \times Post_t$	-0.015	-0.108	-0.008*	-0.0078*		
	(-0.67)	(-0.62)	(-2.22)	(-2.24)		
$ln(Deposits\ MF_{bt})$					-2.14***	0.342**
					(-4.07)	(4.10)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	132	132	132	132	545	545

6 Theoretical Model

6.1 The Need for a Model

I have shown that households earn an excess return by saving dollars in mutual funds instead of banks and that this is consistent with a break of market segmentation of bank deposits. In this section, I develop a model consistent with the empirical features to understand further their implications. There are three reasons why a model is helpful. First, a model will be useful to provide a deeper understanding about the relationship between the mutual fund excess of return and the predominance of mutual funds in dollar savings. Second, there is no counterfactual in which mutual funds do not operate in the current context, where a set of deposit de-dollarization policy toolkits have been already implemented. In that sense, a model will show the interplay between the existence of mutual funds and the current policy toolkits. Third, the lack of a regulatory framework for mutual funds dollar savings begs the question of what would happen if they were regulated. Using a model I can study the effects that such implementation might have. Overall, the goal of the model is to provide a framework to understand these issues rather than provide a hard quantification.

6.2 Outline of the Model

I modified and extend Gopinath and Stein (2021) who model the bank production and the household problem of a representative emerging market[13]. In my model there are two emerging market countries, home and foreign, denoted by $i \in \{H, F\}$, but the focus is the equilibrium in the home country. The role of the foreign country is only to provide savings instruments to the domestic economy in case they can access to them. For instance, we can think of Peru as the domestic economy and Panama as the foreign country. The role of the United States is only to provide an exogenous amount of goods, M[14], that is required for the consumption of the domestic households and to issue dollar currency.

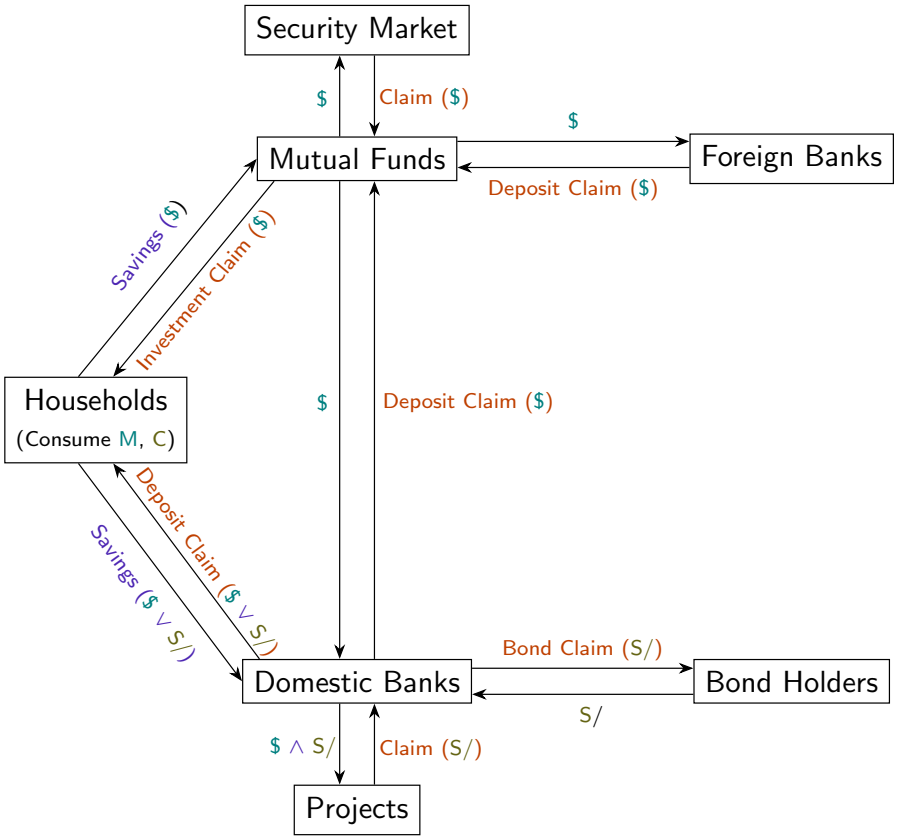
Households in the home country can save through different claims of financial

[13]Their principal theoretical result is that in equilibrium dollar deposits in emerging markets are cheaper compared to local currency deposits even after accounting for exchange rate depreciation. Moreover, in their model the result is connected to the trade-invoicing patterns in which dollar is the predominant currency. In contrast, the goal of my model is to introduce mutual funds as a source of dollar savings in the emerging economy equilibrium.

[14]As I will not focus on the trade effects, without loss of generality I consider that M is large enough to generate a positive demand for dollar savings. This allows me to focus in the equilibrium with positive dollar savings, which is the main object of interest in my analysis.

intermediaries. More specifically, banks are allowed to issue safe-deposits or bonds claims, and mutual funds a general investment claim. Households can select the currencies of their saving within the possibilities that the intermediaries offer: they can save in local currency in banks, or dollars either in banks or in mutual funds. Figure 10 summarizes the main relationships between agents in the model.

Figure 10: Model Structure



Note: This figure summarizes the main relationships between agents in the theoretical model.

6.3 Environment

6.3.1 Risk Neutral Investors

In each country, i, there are risk neutral investors that can save at time 0 and consume only goods from its own country at time 0 and 1. Their preferences are consistent with a linear utility function and they discount the future by β: $U^i = C_0^i + \beta^i E_0 C_1^i$. Considering their preference, they choose the cheapest saving instrument, which in equilibrium I will show that is bank bonds, whose price is denoted Q_R^i. From their optimality condition we will have $Q_R^i = \beta^i$. As a consequence, risk neutral

investors will be the relevant marginal agents that determine bank bond prices.

6.3.2 Domestic Households

Households are risk-averse and have an initial wealth in local currency of W. They can save at time 0 and consume goods at time 0 and 1. Their discount factor, δ, is higher compared to the risk neutral investors, $\delta > \beta^H$. Households purchase domestic goods in local currency and a fixed amount of foreign goods, M, that are priced in dollars. The exchange rate e_t is defined as the ratio between local currency over dollars. At time 0 households do not expect any exchange rate movements: e_1 is distributed $N(e_0, \sigma_\varepsilon)$. Without loss of generality, I normalize the exchange rate at time 0 to 1, $e_0 = 1$.

Domestic households can save at time 0 through three instruments[15]: i) safe bank deposits in local currency cost $Q^H_{B_L}$ at time 0 and pay 1 unit in local currency at time 1, ii) safe bank deposits in dollars deposits cost $Q^H_{B_\$}$ at time 0 and pay 1 unit in dollars at time, iii) mutual funds claims cost $Q^H_{MF_\$}$ at time 0 and pay with uncertainty $1+\chi$ units of dollars at time 1, where χ[16] is distributed $N(0, \sigma_\chi)$ and is independent to e_1. Given these assumptions, households face a trade-off when they decide to allocate their dollar savings among institutions: bank payments are certain, unlike mutual funds, even though both offer the same expected payoffs. This certainty pushes the demand for bank claims as households are risk-averse. However, banks and mutual fund dollar claims have different prices, which might attract demand for mutual funds if their claims are cheaper.

The optimization problem faced by households is given by:

$$\underset{D^H_{B_L}, D^H_{B_\$}, D^H_{MF_\$}}{Max} \quad U(C_0) + \delta \mathbb{E}_0 U(C_1)$$

subject to

$$C_0 = W - Q^H_{B_L} D^H_{B_L} - Q^H_{B_\$} D^H_{B_\$} - Q^H_{MF_\$} D^H_{MF_\$}$$

$$C_1 = D_h + e_1 D^H_{B_\$} + (1+\chi) e_1 D^H_{MF_\$} - e_1 M$$

$$C_0, C_1, D^H_{B_L}, D^H_{B_\$}, D^H_{MF_\$} \geq 0$$

[15]Note that the implicit assumption is that households do not directly invest in securities and that they only can invest indirectly in securities through mutual funds. This assumption is consistent with the low participation of emerging market households in bond markets.

[16]The origin of the uncertainty of the mutual fund payment can come from the unknown returns from the stock markets or the impact that unpredictable mutual fund flows might have on the payoff.

For tractability, I assume that $U(.)$ is a mean-variance utility function with a coefficient of risk aversion of ψ. Let's define the following terms before establishing the optimal household solution:

$$\kappa \equiv Q^H_{B_\$} - Q^H_{MF_\$}$$

$$v \equiv -Q^H_{B_\$} + \delta + M\delta\psi\sigma^2_\varepsilon$$

Note that κ represents the mutual fund cheapness over banks as it measures the expected marginal income that households get for allocating their dollars in mutual funds instead of banks: they save $Q^H_{B_\$}$ for not investing in banks, but they spend $Q^H_{MF_\$}$ for investing in mutual funds. In an equilibrium where households use bank deposits to purchase foreign goods, this also represents the marginal utility of increasing mutual funds dollar holdings by one unit. Regarding v, it represents the convenience for saving dollar deposits in banks to purchase foreign goods instead of using local currency. More specifically, it measures the expected marginal utility for purchasing the foreign good using bank savings in dollars instead of local currency: it costs $Q^H_{B_\$}$, but they can get an expected return of δ units next period and also gain $M\delta\psi\sigma^2_\varepsilon$ for hedging against exchange rate fluctuations by holding dollars instead of the local currency. Also, $\kappa + v$ represents the expected utility for purchasing the foreign good using mutual funds savings in dollars instead using local currency.

Now, let's define the household demand of assets: the first order condition regarding savings in local currency is given by $Q^H_{B_L} = \delta$, while the remaining first order conditions imply the following demand of dollar savings:

$$\left(D^H_{B_\$}, D^H_{MF_\$}\right) = \begin{cases} \left(\frac{-Q^H_{B_\$}+\delta}{\delta\psi\sigma^2_\varepsilon} + M, 0\right) & if \;\; \kappa < 0 \;\; and \;\; v > 0 \\ \left(0, \frac{-Q^H_{MF_\$}+\delta+M\delta\psi\sigma^2_\varepsilon}{\delta\psi\left[\sigma^2_\varepsilon+\sigma^2_\chi\left(\sigma^2_\varepsilon+1\right)\right]}\right) & if \;\; \kappa + v > 0 \;\; and \;\; \kappa\frac{\sigma^2_\varepsilon}{\sigma^2_\chi\left(\sigma^2_\varepsilon+1\right)} > v \\ \left(\frac{-Q^H_{B_\$}+\delta}{\delta\psi\sigma^2_\varepsilon} + \frac{-Q^H_{B_\$}+Q^H_{MF_\$}}{\delta\psi\sigma^2_\chi\left(\sigma^2_\varepsilon+1\right)} + M, \frac{Q^H_{B_\$}-Q^H_{MF_\$}}{\delta\psi\sigma^2_\chi\left(\sigma^2_\varepsilon+1\right)}\right) & if \;\; \kappa > 0 \;\; and \;\; \kappa\frac{\sigma^2_\varepsilon}{\sigma^2_\chi\left(\sigma^2_\varepsilon+1\right)} < v \end{cases}$$

The first corner solution indicates that a household only save dollars in banks and this equilibrium is identical to Gopinath and Stein (2021). The intuition for its existence is simple: it arises when saving in mutual funds is more expensive than in banks and also convenient for purchasing foreign consumption goods instead of

using local currency. Within this equilibrium, a decrease in the price of the instrument (or equivalently an increase in the expected returns), or an increase in the imported goods is associated with a higher demand for saving dollars in banks. The second corner solution implies that a household only save dollars through mutual funds. Conversely than before, this equilibrium emerges when mutual funds claims are cheaper than banks deposits, but also is more convenient than local currency for purchasing foreign consumption goods. In this equilibrium, a decrease in the price of the instrument or an increase in the purchasing of foreign goods is associated with a higher demand for mutual funds in dollars. Finally, there is also an interior solution in which households allocate dollar savings in both institutions. This equilibrium is sustained when bank deposits are convenient for purchasing foreign goods and mutual funds savings are cheaper than banks, but not too cheap to push away the use of bank dollar deposit. As expected, an increase of a given price reduces the demand for such type of savings, but increases the demand of the other type of savings. Moreover, interestingly, an increase in the purchasing of foreign goods is only associated with an increase in dollar savings in banks, but not in mutual funds. Intuitively, if a household is saving in both institutions, foreign goods will be purchased using dollar savings in banks as they are not affected by the uncertainty in returns.

The following proposition encapsulates the condition that ensures that households choose mutual funds to allocate dollar savings:

Proposition 1. (Preference for Saving Dollars in Mutual Funds) *Households that find optimally saving dollars choose to allocate their funds in mutual funds,* $D^H_{MF_\$} \geq 0$*, as long as* $Q^H_{B_\$} \geq Q^H_{MF_\$}$.

6.3.3 Home Country Bank Production

There is a continuum number of home banks and its total mass is one. They have a fixed set of risky projects with value N^H that pays γ^H, where γ^H is a random variable with mean $\widetilde{\gamma}^H$. Banks finance the projects by issuing three types of debt: safe local currency deposits $S^H_{B_L}$, safe dollar currency deposits $S^H_{B_\$}$, and risky local currency bonds S^H_R. The prices of each type of debt are $Q^H_{B_L}$, $Q^H_{B_\$}$, and Q^H_R, respectively. Due to regulation, the issuance of the bank claims are constrained by the worst return realization of the projects, $\underline{\gamma}^H$, and the highest realization of the exchange rate depreciation, $\overline{e}^H > 1$. Similar to Gopinath and Stein (2021), I assume

that home banks are price takers for local deposits[17] and bonds, but price makers[18] for dollar deposits. Home banks choose the amount of issuance for each debt.

The optimization problem faced by home banks is given by

$$Max_{S^H_{B_L}, S^H_{B_\$}, S^H_R} E_0 \left[\gamma^H N^H - S^H_{B_L} - e^H_1 S^H_{B_\$} - S^H_R \right]$$

subject to

$$Q^H_{B_L} S^H_{B_L} + Q^H_{B_\$} S^H_{B_\$} + Q^H_R S^H_R \geq N^H \tag{4}$$

$$S^H_{B_L} + \bar{e}^H S^H_{B_\$} \leq \underline{\gamma}^H N^H \tag{5}$$

$$S^H_{B_\$} = D^H_{B_\$,T} \tag{6}$$

Let's consider that λ^H and φ^H are the Lagrangian multipliers of the financing and regulatory restrictions, respectively. As a result, the first-order conditions are[19]:

$$Q^H_{B_L}: \qquad Q^H_{B_L} = \frac{1}{1 - \frac{1}{\eta^H_L}} \times \frac{1 + \varphi^H}{\lambda^H}$$

$$Q^H_{B_\$}: \qquad Q^H_{B_\$} = \frac{1}{1 - \frac{1}{\eta^H_\$}} \times \frac{1 + \varphi^H \bar{e}^H}{\lambda^H}$$

$$Q^H_R: \qquad Q^H_R = \frac{1}{\lambda^H}$$

where η^H_L and $\eta^H_\$$ are the demand elasticities of the safe deposits in the home country defined as $\eta^H_L \equiv -\frac{\partial D^H_{B_L}}{\partial Q^H_{B_L}} \times \frac{Q^H_{B_L}}{D^H_{B_L}}$ and $\eta^H_\$ \equiv -\frac{\partial D^H_{B_\$}}{\partial Q^H_{B_\$}} \times \frac{Q^H_{B_\$}}{D^H_{B_\$,T}}$. These first order conditions provide a simple extension of Gopinath and Stein (2021) as it allows for

[17] Empirically, for my setup this assumption can be justified on the fact that banks compete significantly with small non-bank financial institutions (such as *Cajas Municipales*, *Cajas Rurales*, *Edpymes*) in the local term deposit market as they offer on average higher deposit rates to attract clients to fund their operations. Also, note that the perfect competition in the local deposit market do not affect the main implications of the model as the objects of interest are the dollar savings.

[18] This assumption generalize the results of the perfect competition case as it allows to consider a flexible market structure. The existence of an imperfect competitive market in dollar deposits in my setup is supported by the fact that banks are the main participants of the dollar deposit market as they engage heavily in borrowing dollar loans, while small non-bank financial institutions do not. As the model explores the different dollar deposit markets, the assumption also allows to recognize the cross-country variation of market structures.

[19] For exposition purpose and sake of generality I still include η^H_L as part of the optimization problem, but under my assumptions it will be equivalent to set $\eta^H_L \to \infty$.

imperfect competition in the dollar deposit market. More specifically, the bank problem collapse to theirs whenever $\eta_L^H \to +\infty$ and $\eta_\$^H \to +\infty$.

6.3.4 Foreign Country Bank Production

There is a continuum number of foreign banks and its total mass is one. They have a fixed set of risky projects with value N^F that pay γ^F, where γ^F is a random variable with mean $\widetilde{\gamma}^F$. For simplicity, I assume that the only currency in the foreign country is the dollar[20]. Foreign banks finance their projects by issuing two types of debt: safe dollar currency deposits $S^F_{B_\$}$ and risky dollar currency bonds S^F_R. The prices of each type of debt are $Q^F_{B_\$}$ and Q^F_R, respectively. They are price makers for deposits and price takers for bonds. Foreign banks choose the price of each type of debt. The demand for dollar deposits of foreign households is denoted by $D^F_{B_\$,T}$.

The optimization problem faced by foreign banks is given by:

$$Max_{Q^F_{B_\$},Q^F_R} E_0\left[\gamma^F N^F - S^F_{B_\$} - S^F_R\right]$$

subject to

$$Q^F_{B_\$} S^F_{B_\$} + Q^F_R S^F_R \geq N^F \tag{7}$$

$$S^F_{B_\$} = D^F_{B_\$,T} \tag{8}$$

Define with φ^F and λ^F the Lagrangian multipliers of the regulatory and financing restrictions. As a result, the first-order conditions of the problem are:

$$Q^F_{B_\$}: \qquad Q^F_{B_\$} = \frac{1}{1-\frac{1}{\eta^F_\$}} \times \frac{1}{\lambda^F}$$

$$Q^F_R: \qquad Q^F_R = \frac{1}{\lambda^F}$$

where $\eta^F_\$$ is the demand elasticity of the safe dollar deposits in the foreign country defined as $\eta^F_\$ \equiv -\frac{\partial D^F_{B_\$}}{\partial Q^F_{B_\$}} \times \frac{Q^F_{B_\$}}{D^F_{B_\$,T}}$.

6.3.5 Domestic Dollar Mutual Fund Productions

There is a continuum number of mutual funds with a total mass of $S^H_{MF_\$}$ that operate in competitive market. They finance their activities by issuing 1 unit of

[20] This assumption does not affect the main prediction of the model

dollar claims that has a price of $Q^H_{MF_\$}$. They purchase mainly relatively safe assets in dollars such as money market funds. Mutual funds do not have any type of government regulation regarding their investments and they can allocate their funds across countries. Due to their investment mandate that prioritizes holding safe assets, the share of the issuance that is allocated to risky securities abroad, θ_R, has a cap of $\overline{\theta}_R$. I assume that foreign riskier securities are cheaper than foreign dollar deposits, $Q^F_{B_\$} > Q^F_R$. The constraint related to θ_R will be always binding as long as $Q^H_{B_\$} > Q^F_{B_\$}$, which I will show that holds in equilibrium. Mutual funds hold a share θ_F of their issuance in dollar deposits of foreign banks and $1 - \theta_F - \theta_R$ in local banks.

Regarding the costs, mutual funds have a convex cost structure, $\frac{1}{2}\Phi\theta_F^2$, for investing a share θ_F of their issuance abroad. The intuition for this specification is that mutual funds will need to reach for new foreign banks or countries to invest an additional share of funds, but allocating an extra share becomes more expensive as they exhausted the less costly options before[21]. Under this specification, Φ is a reduced form parameter that scales the magnitude of the costs and can be interpreted as the implied cost of market segmentation of dollar deposits across countries. For instance, when $\Phi \to \infty$, then markets are completely segmented, while when $\Phi \to 0$, there is a full break of the market segmentation[22]. Additionally, management costs of the fund are equal to ζ.

The optimization problem faced by mutual funds is given by:

$$Max_{\theta_F,\theta_R}\ E_0\left[Q^H_{MF_\$} - (1-\theta_F-\theta_R)\,Q^H_{B_\$} - \theta_F Q^F_{B_\$} - \theta_R Q^F_R - \frac{1}{2}\Phi\theta_F^2 - \zeta\right]$$

subject to

$$\theta_R \leq \overline{\theta}_R \tag{9}$$

[21]The specific microfoundation for this cost is beyong the scope of the paper, but the reader can interpret it as a convenient reduce form function of a complex search problem with increasing search costs. The function will be also a good approximation in the case where firms pay a fixed cost to allocate a small fraction on their investments abroad in a given financial institution and that such fixed cost increases with the total fraction invested abroad. In such as case, the total costs will be a piece-wise function that can be approximated using the convex formula.

[22]This modeling form of the break of the market segmentation has a symmetrical equilibrium from the households perspective. Specifically, if we assume that households invest directly in domestic and foreign banks and that they face a convex cost that is a function of the amount that they invest in foreign banks, we will get a symmetrical demand for foreign deposits. Nevertheless, I prefer to model mutual funds separately, considering that, in practice, they are the primary entities involved in foreign investments and that households save through them.

As a result, the interior first-order condition of the problem is:

$$\theta_F : \qquad \theta_F = \frac{Q^H_{B_\$} - Q^F_{B_\$}}{\Phi}$$

Also, the free entry condition implies that:

$$Q^H_{MF_\$} = (1 - \theta_F - \theta_R)\, Q^H_{B_\$} + \theta_F Q^F_{B_\$} + \theta_R Q^F_R + \frac{1}{2}\Phi\theta_F^2 + \zeta$$

6.3.6 Market Clearing Conditions

Lastly, I establish the market clearing conditions for the domestic economy. As households are the only agents saving local currency in banks and dollars in mutual funds we should have:

$$D^H_{B_L} = S^H_{B_L}$$
$$D^H_{MF_\$} = S^H_{MF_\$}$$

Regarding dollar savings in banks, the total dollar demand for bank savings, $D^H_{B_\$,T}$, includes the holdings of households and mutual funds and it is given by $D^H_{B_\$,T} \equiv D^H_{B_\$} + \left(1 - \theta_F - \overline{\theta}_R\right) D^H_{MF_\$}$. The market clearing condition implies that:

$$D^H_{B_\$,T} = S^H_{B_\$}$$

Finally, the regulation constraint for banks is given by:

$$D^H_{B_L} + \overline{\varepsilon}^H \left(D^H_{B_\$} + \left(1 - \theta_F - \overline{\theta}_R\right) D^H_{MF_\$}\right) = \underline{\gamma}^H N^H$$

6.4 Main Theoretical Predictions

6.4.1 Dollar privilege in the local market

A well documented fact regarding dollar denominated assets is that they earn an exorbitant privilege, that is, they pay lower return than other assets. In the model, the existence of a privilege would imply that banks issue safe dollar claims with a higher price than in the local currency. The model is able to replicate this feature under some assumptions described in the following proposition:

Proposition 2. (Dollar deposit privilege) *Suppose that home depositors are more inelastic*

for dollars deposits than in local currency, $\eta_L^H \geq \eta_\$^H$, and that elasticities are constant. Then, in an equilibrium in which banks issue all types of debts we will have $Q_{B_\$}^H > Q_{B_L}^H > Q_R^H$, which implies a higher price for dollar claims, and a lower expected return. Similarly, for the foreign country we obtain $Q_{B_\$}^F > Q_R^F$.

This result is an extension of Gopinath and Stein (2021), who considered the perfect competition case and as a consequence there was no role for deposit elasticities. Indeed, my result collapse to their Proposition 1 when $\eta_L^H = \eta_\$^H \to +\infty$. According to the proposition, besides the comparative disadvantage of banks in the creation of dollar safe deposits that makes its price higher in both countries, the elasticities of demand for in the domestic economy also affect the price of the assets. This result provides a different channel for the dollar privilege and its aligned with the evidence documented in Gutierrez, Ivashina, and Salomao (2023), where we extensively show that the preference of local depositors imply lower deposit returns for dollar deposits, which is pass-through loan prices. Also, this is consistent to the theoretical explanation of Bocola and Lorenzoni (2020).

6.4.2 Cross-country variation of dollar deposit rates

As banks are only able to collect deposits within their own country, dollar deposit rates are going to depend on their local market conditions. Using the first order conditions with respect to $Q_{B_\$}^H$ and $Q_{B_\$}^F$, and the equilibrium conditions of the risk-neutral investors, I obtain the following relationship between prices of domestic and foreign dollar deposits:

$$\frac{Q_{B_\$}^F}{Q_{B_\$}^H} = \underbrace{\frac{1-\frac{1}{\eta_\$^H}}{1-\frac{1}{\eta_\$^F}}}_{\textit{Elasticities Ratio}} \times \underbrace{\frac{1}{1+\left(\frac{\delta}{\beta^H}-1\right)\bar{e}^H}}_{\textit{Regulations Ratio}} \times \underbrace{\frac{\beta^H}{\beta^F}}_{\textit{Discounts Ratio}}$$

Moreover, I state the following proposition:

Proposition 3. (Cross-country dollar deposit rates) *Assume that home depositors are more inelastic for dollar deposits than foreign depositors, $\eta_\$^F \geq \eta_\$^H$, that elasticities are constant, and that discount factors of bank bond holders are similar in both countries: $\beta^F \simeq \beta^H$. Then, in an equilibrium in which home and foreign banks issue dollar deposits we will have $Q_{B_\$}^H > Q_{B_\$}^F > Q_R^H = Q_R^F$, which implies a higher price for dollar claims in the home country than in the foreign, and a lower expected return.*

This result provides a rationale for the cross-sectional variation of dollar deposit

returns. More specifically, the disparities in preferences across countries might explain any dollar rates differentials. Also, note that as the deposit markets are segmented, the presence of the friction will prevent the dollar prices to equalize. This differentials in prices will be exploited by mutual funds, which are allow to invest across countries.

6.4.3 Mutual fund excess return and the break of market segmentation

Domestic banks are restricted to the local forces behind the deposit market due to market segmentation. In constrast, mutual funds have the possibility to break the local market segmentation of deposits by investing abroad, which potentially allows them to obtain higher returns than domestic banks. Using, the parameter Φ as the measure of market segmentation, I derive the following proposition:

Proposition 4. (Mutual Fund Dollar Premium and the Break of Segmentation) *Assume that the conditions required for Proposition 3 hold, then there exists a level of break of market segmentation, $\overline{\Phi}$, such that for any $\Phi > \overline{\Phi}$ in equilibrium we will have $Q^H_{B_\$} > Q^H_{MF_\$}$, which implies that a lower price for mutual funds dollar claims, and a expected return premium for saving dollars in mutual funds compared to banks. Also, following Proposition 1, in equilibrium, households will always save a positive amount of dollars in mutual funds, $D^H_{MF_\$} > 0$.*

The previous proposition provides a straightforward equilibrium-based explanation for the choice of households to save dollars in mutual funds. Essentially, the break of the market segmentation allows mutual funds to exploit the fact that foreign households are less elastic to dollar savings than domestic households. If the break is to high that households pay a lower price for their dollar claims in mutual funds, in equilibrium they will hold positive mutual fund savings.

An additional implication of the the break of market segmentation is that mutual funds might be choosing optimally their allocations across countries. For that to be the case, mutual funds should be reallocating their investments in response to changes to returns. Delving into the implications of the model, we can also derive the following proposition:

Proposition 5. (Mutual Fund Cross-Country Reallocation) *A lower value of $Q^F_{B_\$}$ (alternatively a higher value of $Q^H_{B_\$}$ or a lower value of $Q^F_{B_\$} - Q^H_{B_\$}$) increases the share of mutual funds investments abroad, θ_F. If mutual funds invest in several foreign countries, a reduction in the price of the dollar deposits in a given country (alternatively a lower value with respect to the home country) lead to an increase in the share invested in such foreign country.*

6.4.4 Savings Stickiness and Dollarization with Mutual Funds

I begin by exploring the implications for saving stickiness by using counterfactual scenario wherein an economy, initially reliant solely on banks to save, experiences a the introduction of mutual funds as an alternative source for saving in dollars. I obtain the following proposition:

Proposition 6. (Dollar Savings Stickiness with Mutual Funds) *Dollar deposits from households are more responsive to prices in an equilibrium where households allocate dollars in banks and mutual funds than in the equilibrium without mutual funds,* $|\frac{\partial D^H_{B_\$,without\ MFs}}{\partial Q^H_{B_\$}}| < |\frac{\partial D^H_{B_\$,with\ MFs}}{\partial Q^H_{B_\$}}|$. *Additionally, the aggregate bank dollar deposits in the economy are less sticky under the presence of mutual funds,* $|\frac{\partial D^H_{B_\$,T,without\ MFs}}{\partial Q^H_{B_\$}}| < |\frac{\partial D^H_{B_\$,T,with\ MFs}}{\partial Q^H_{B_\$}}|$.

The previous propositions comes from the fact that when households save in mutual funds they face some uncertainty due to the unexpected shock, which makes them more reactive to prices or expected returns than in the case with banks where they do not face any uncertainty. As a result, the total dollar deposits in the economy, $D^H_{B_\$,T}$, will be less sticky as mutual funds will pass-through the uncertainty to banks by reallocating their funds whenever they face changes in their price of their claims or in the instruments in which they invest. This implies that the liability structure of banks will be more unstable.

6.5 Extensions

6.5.1 Projects in multiple currencies

I extend the simple model allow banks to fund projects that repay in dollars. These types of projects may carry higher risk compared to those denominated in local currency, as they could be susceptible to currency mismatches, especially considering that local firm's revenues are primarily in the local currency. However, banks can use their dollar deposits to finance dollar projects. For that reason, I introduce three modifications to try to capture the main forces. First, I assume that the bank allocates a share ω of the projects in dollars and the remaining $1-\omega$ in local currency. Second, the return of a project in dollars is given by $\gamma^H_\$$ while for local currency is γ^H_L. Third, I modify the degree of risk aversion of the bank: instead of being risk-neutral and maximizing a function like $E(\Pi)$, I consider that the banks maximize $E(\Pi) - \frac{b}{2}Var(\Pi)$, where b captures the degree of risk aversion (as in Froot, Scharfstein, and Stein, 1993). Considering these changes, the bank problem implies the

following optimality condition regarding ω:

$$\omega: \qquad \omega = \frac{\overline{\gamma}_{\$}^{H} N - \overline{\gamma}_{L}^{H} N + \left(\frac{\delta}{\beta^{H}} - 1\right)\left(-\underline{\gamma}_{L}^{H} N + \overline{\varepsilon}^{H} \underline{\gamma}_{\$}^{H} N\right)}{2b\sigma_{\epsilon}^{2}\left(\overline{\gamma}_{\$}^{H} N\right)^{2}} + \frac{D_{B_{\$,T}}^{H}}{\overline{\gamma}_{\$}^{H} N}$$

There is a positive relation between the demand for dollar deposits $D_{B_{\$}}^{H}$ and the share of projects in dollars, ω. Projects in dollars represent a natural hedge for the dollar liabilities given that both are exposed to exchange rate risk. If the decrease in market segmentation (lower Φ) leads to an decrease of $D_{B_{\$,T}}^{H}$, banks will reduce their projects in dollars, ω, and as a consequence their riskiness as projects in dollars tend to be riskier due to their exposure to exchange rate.

7 Quantitative Exercises

In this section I provide a set of relevant quantitative exercises using the extended model to shed lights on the effects on banks and mutual funds of two relevant policy counterfactuals: i) The implementation of deposit de-dollarization policies. ii) The introduction of mutual fund regulations.

7.1 Calibration

I start by presenting in Table 9 the main parameter values employed in the quantitative exercises. First, I present the elements that I have calibrated using the model conditions. Second, I show the parameters that I have calibrated using the empirical estimates. Third, I display the standard risk aversion parameters that I will use in the exercise. Finally, I display the parameters that I have calibrated targeting specific empirical estimates. As a validation for the calibration, I provide the set of target and untargeted moments that it matches in Table 10.

7.2 Unintended Consequences of Deposit De-Dollarization Policies

An important question to understand is how do deposit de-dollarization policies affected the accumulation of savings across institutions and whether it creates some additional source of risk for the economy. The model is useful since it a tighter deposit de-dollarization policy is represented by a higher value of $\overline{\varepsilon}^{H}$, which allows me to study the the relevant counterfactuals effect on prices and quantities as well as how this policy interacts with potential sources of risk.

Although the the deposit de-dollarization policy will have a direct negative impact on dollar deposits, the effect on the dollar savings allocated in mutual funds will

Table 9: Parametrization

Parameter	Value	Source
A. Model Conditions		
δ	0.96	12-month average $\frac{1}{1+R^H_{B_L}}$
β^H	0.951	12-month average $\frac{1}{1+R^H_R}$
β^F	0.92	12-month average $\frac{1}{1+R^F_R}$
B. Data Estimates		
θ_R	0.15	Mutual funds share invested in securities
σ^2_χ	0.0006	12-month mutual fund return volatility
σ^2_ε	0.0083	12-month exchange rate volatility
$\underline{\gamma}^H$	0.83	Lowest historical loan recovery rate
$\overline{\zeta}$	1%	Mutual fund fees
$\overline{\gamma}^H_L$	1.03	Average local currency loan recovery rate
$\overline{\gamma}^H_\$$	1.02	Average dollar loan recovery rate
$\underline{\gamma}^H_L$	0.89	Worst historical local currency loan recovery rate
$\underline{\gamma}^H_\$$	0.69	Worst historical dollar loan recovery rate
M/W	23.6	Historical annual share of imports
W	30000	Normalization
C. Outside Parameters		
ψ	2	Standard household risk adverse parameter
b	4	Firm risk adverse parameter
D. Calibrated Parameters		
Φ	0.02	Matches the share of MF portfolio allocated to domestic deposits
N	11750	Matches the share of deposit dollarization
$Q^F_{B_\$}$	0.96	Matches after-tax MF excess return

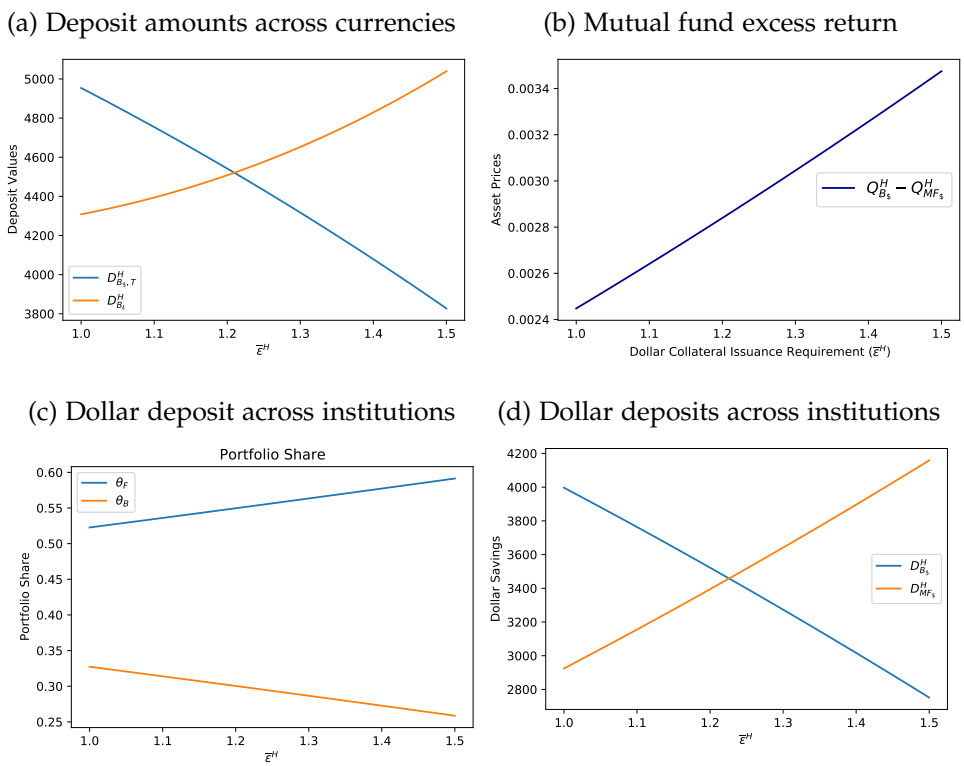
Table 10: Targeted and Untargeted Moments

Moment	Model	Data	Type
Share of deposit dollarization	53.7%	54.3%	Targeted
After-tax MFs excess return	0.25%	0.33%	Targeted
Share of MF portfolio allocated to foreign deposits	54%	50%	Targeted
Share of dollar savings allocated to MFs	73%	77%	Untargeted

be uncertain. From the supply side, mutual funds will be affected by the policy restriction of local deposits because they rely on such instruments. However, they can shift their deposits to investment abroad and mitigate partially the policy. Regarding prices, dollar deposits will be more costly given that bank issuance is restricted. Mutual fund prices will go up due their reliance of domestic deposits, but also because they need to invest abroad and it is costly. From the demand side, households will allocate more dollar savings in mutual funds only if the increase in dollar deposit prices is higher than mutual fund prices. Only after inspecting the equilibrium I can provide a deeper understanding of whether it might create an additional risk for the economy.

Figure 11 presents the quantitative results following the implementation of a deposit de-dollarization policy by showing the effect of an increase of $\bar{\varepsilon}^H$ on several outcomes. First, the total deposit dollarization in the economy goes down as a result of a tighter dollar issuance restriction. Second, the more restrictive the dollar deposit regulatory constraint, the cheaper mutual funds are compared to banks for dollar savings. This result is explained by the fact that banks increase their dollar deposit price as a response of the regulation. Mutual funds are also indirectly affected because they hold domestic deposits, but as they are allowed to deposit abroad they respond by substituting out domestic deposits with foreign deposits, which generates that their price increases less than for bank deposits. Third, an unintended consequence of the policy is that households allocate more savings in mutual funds following the introduction of the policy, which implies that any potential financial risk associated with dollar savings is partially being shifted from banks to mutual funds.

Figure 11: Counterfactual effects of an increase in $\bar{\varepsilon}^H$



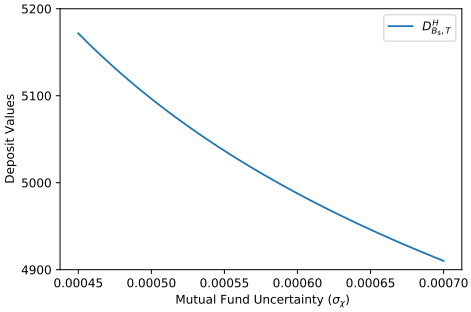
Note. Average credit growth by the four largest banks to the sample of firms connected to all four banks. Panel (a) displays the average credit growth for all firms in the sample across banks. The next panels split the sample in two groups depending on: total firm debt size from all banks in previous years (panel **??**), the firm posted collateral (panel **??**), and firm age (**??**).

As mutual funds are more runnable than banks, an increase of mutual fund savings might impact financial stability especially due to the significant domestic deposit holdings of mutual funds. Using the model as a laboratory I can study whether a potential mutual fund withdrawal risk is indirectly mitigated or not by the deposit de-dollarization policy. More specifically, I analyze how does an instantaneous increase in mutual fund return uncertainty, σ_χ^2, affect dollar deposit withdrawals in the banking system (measured by the reduction of the dollar deposit holdings of the domestic banking system, $D^H_{B\$,T}$,) under different tightness levels of the policy, $\bar{\varepsilon}^H$. In general the effect of σ_χ^2 on $D^H_{B\$,T}$ is uncertain: a higher mutual fund uncertainty reduces mutual fund deposit holdings as they need to redeem their claims, but it also increases the demand for dollar deposits as households substitute out their mutual fund holdings. Figure 12 displays the results and it indicates that although a higher mutual uncertainty might generates deposit withdrawals, this impact is mitigated the higher the tightness of the deposit de-dollarization policy. The intuition is that a

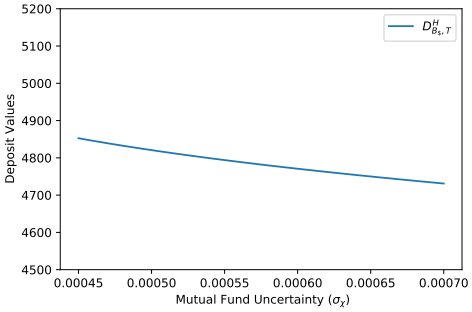
more restrictive dollarization policy reduces the volume of mutual fund household holdings and the reliance of mutual funds on domestic bank deposits such that the total reduction of mutual fund withdrawals of bank deposits cancels out with the increase of demand for dollar deposits from households when $\bar{\varepsilon}^H = 1.165$.

Figure 12: Counterfactual effects of an increase in σ_χ^2 on $D^H_{B_\$,T}$ for different $\bar{\varepsilon}^H$ values

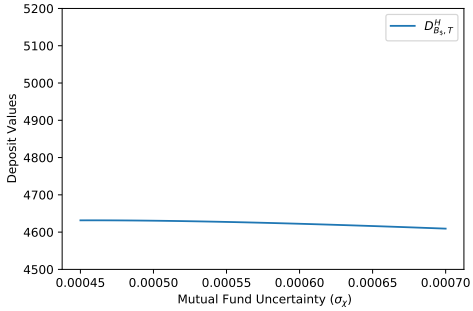
(a) Response for $\bar{\varepsilon}^H = 1$



(b) Response for $\bar{\varepsilon}^H = 1.1$



(c) Response for $\bar{\varepsilon}^H = 1.165$



7.2.1 Regulation of Mutual Funds

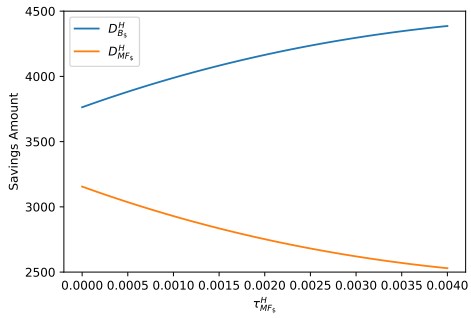
One concern with the raise of mutual funds is the lack of an specific regulatory framework due to the potential risks to the financial system. For that reason, I explore how does the equilibrium is affected by two types of policies with an emphasis on impact of savings in dollars: i) a tax to households for their mutual funds holdings, τ_h^H, and ii) a tax to mutual fund for their domestic deposits holdings, $\tau^H_{MF_\$}$.

I calibrate the range of magnitudes of τ_h^H and $\tau^H_{MF_\$}$ such that both generate the same of mutual fund household holdings in equilibrium, $D^H_{MF_\$}$. Although it might seem that both policies might produce identical outcomes responses they do not. Figure 12 displays the quantitative results. A tax to households is directly pass-through without affecting the portfolio choice of mutual funds, while the tax to mutual funds

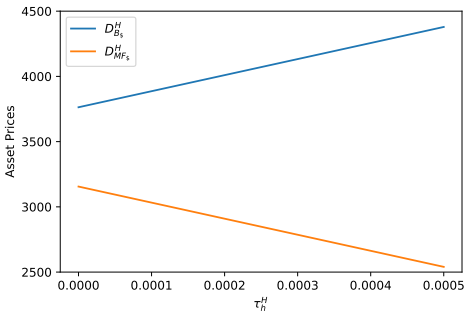
deposits holdings will be indirectly to households through the price, but also will reduce the share that mutual funds invest in domestic deposits as they face higher costs for such deposits. As a result, although both policies might generate similar impacts on $D^H_{MF_\$}$ and $D^H_{B_\$}$, the implementation of $\tau^H_{MF_\$}$ will reduce the total value on domestic dollar deposits, $D^H_{B_\$,T}$, as mutual funds will substitute away domestic deposits for foreign deposits.

Figure 13: Counterfactual effects of the introduction of τ^H_h or $\tau^H_{MF_\$}$

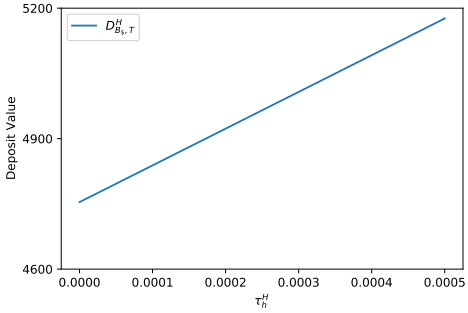
(a) Household dollar savings response of τ^H_h



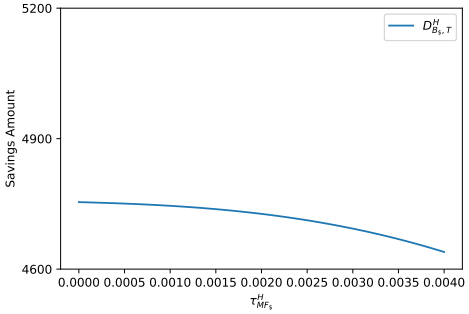
(b) Household dollar savings response of $\tau^H_{MF_\$}$



(c) Total dollar savings response of τ^H_h



(d) Total dollar savings response of $\tau^H_{MF_\$}$



8 Concluding Remarks

In this paper I have unveiled the predominance of money market-like mutual funds as source of dollar savings across emerging markets. Using Peruvian data, I found that households earn an excess return for saving dollars in mutual funds rather than in banks and that this fact is related with the ability of mutual funds to break the traditional market segmentation of dollar deposits by investing in foreign banks. Through the lens of a model, I have shown that the existence of this premium is consistent with the rise of mutual funds as a source of dollar savings

I found a trade-off regarding the effects of the raise of mutual funds on financial stability. On one side, the financial system is less exposed to exchange rate risk as a sizable share of dollar savings is invested abroad. On the other side, mutual funds become significant term-deposit holders in domestic banks, which makes banks prone to withdrawals. After a meaningful mutual fund redemption, banks substantially financed by mutual funds increased their loan rates and sold their dollar securities. Using the model insights I found that although deposit de-dollarization policies increased the share of dollar savings in mutual funds, they mitigate the impact that mutual fund uncertainty generates on deposit withdrawals.

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Appendix

Theoretical Appendix:

A.1 Proof of Proposition 1:

From the household optimality problem, to have $D^H_{MF_\$} = 0$ in equilibrium is $\kappa < 0$. Instead, we have $D^H_{MF_\$} > 0$ whenever we have $\kappa + v > 0$ and $\kappa \frac{\sigma_\varepsilon^2}{\sigma_\chi^2\left(\sigma_\varepsilon^2+1\right)} > v$ or $\kappa > 0$ and $\kappa \frac{\sigma_\varepsilon^2}{\sigma_\chi^2\left(\sigma_\varepsilon^2+1\right)} < v$. Note that both set of conditions that ensure that $D^H_{MF_\$} > 0$ imply $\kappa > 0$, which is equivalent to state $Q^H_{B_\$} - Q^H_{MF_\$} > 0$.

A.2 Proof of Proposition 2:

Considering the optimal bank pricing conditions, that $\eta^H_\$ > 1$ and $\eta^H_L > 1$ as in any monopolistic problem, that $\varphi^H > 0$, and $\bar{\varepsilon}^H > 0$, we get:

$$Q^H_{B_L} = \frac{1}{1-\frac{1}{\eta^H_L}} \times \frac{1+\varphi^H}{\lambda^H} > \frac{1+\varphi^H}{\lambda^H} > \frac{1}{\lambda^H} = Q^H_R \;\; \Rightarrow \;\; Q^H_{B_L} > Q^H_R$$

$$Q^H_{B_\$} = \frac{1}{1-\frac{1}{\eta^H_\$}} \times \frac{1+\varphi^H\bar{\varepsilon}^H}{\lambda^H} > \frac{1+\varphi^H\bar{\varepsilon}^H}{\lambda^H} > \frac{1}{\lambda^H} = Q^H_R \;\; \Rightarrow \;\; Q^H_{B_\$} > Q^H_R$$

Therefore the asset with the lowest price is the bond. As a result, the risk neutral investors will choose to hold bonds which implies $Q^H_R = \beta$ and $\frac{1}{\lambda^H} = \beta$. Finally, after comparing $Q^H_{B_\$}$ and $Q^H_{B_L}$ and using the previous finding we get:

$$\frac{1}{1-\frac{1}{\eta^H_\$}} \times \frac{1+\varphi^H\bar{\varepsilon}^H}{\lambda^H} > \frac{1}{1-\frac{1}{\eta^H_L}} \times \frac{1+\varphi^H}{\lambda^H} \;\; \Leftrightarrow \;\; Q^H_{B_\$} > Q^H_{B_L} > Q^H_R$$

The proof for the foreign country is analogous.

A.3 Proof of Proposition 3:

The prices of dollar claims in each of the countries, $Q^H_{B_\$}$ and $Q^F_{B_\$}$, combined with the optimal conditions of the risk neutral investors imply that $Q^H_{B_\$} = \frac{1}{1-\frac{1}{\eta^H_\$}} \times \left(1+\left(\frac{\delta}{\beta^H}-1\right)\bar{\varepsilon}^H\right) \times \beta^H$ and $Q^F_{B_\$} = \frac{1}{1-\frac{1}{\eta^F_\$}} \times (1) \times \beta^F$. Under the assumption that

$\beta^F \simeq \beta^H$ and $\eta^F_\$ \geq \eta^H_\$$ we obtain:

$$\frac{1}{1-\frac{1}{\eta^H_\$}} \times \left(1+\left(\frac{\delta}{\beta^H}-1\right)\bar{\varepsilon}^H\right) \times \beta^H \geq \frac{1}{1-\frac{1}{\eta^F_\$}} \times \beta^F \quad \Rightarrow \quad Q^H_{B_\$} \geq Q^F_{B_\$}$$

Using Proposition 2, we can conclude that:

$$Q^H_{B_\$} \geq Q^F_{B_\$} > Q^H_R$$

A.4 Proof of Proposition 4:

Using the optimal porftolio allocation condition $\theta_R = \overline{\theta}_R$ and $\theta_F = \frac{Q^H_{B_\$} - Q^F_{B_\$}}{\Phi}$, we can write the equilibrium price of mutual funds: $Q^H_{MF_\$}(\Phi) \equiv \left(1-\theta_F-\overline{\theta}_R\right) Q^H_{B_\$} + \theta_F Q^H_{B_\$} + \overline{\theta}_R Q^F_R + \frac{1}{2}\Phi\left(\frac{Q^H_{B_\$}-Q^F_R}{\Phi}\right)^2 + \zeta$. As we want to find the conditions where $Q^H_{B_\$} \geq Q^H_{MF_\$}$, we can obtain the threshold level $\overline{\Phi}$ that makes $Q^H_{MF_\$}\left(\overline{\Phi}\right) = Q^H_{B_\$}$. Solving for $\overline{\Phi}$ gives $\overline{\Phi} = \frac{\left(Q^H_{B_\$}-Q^H_R\right)^2}{2} \times \frac{1}{\zeta - \overline{\theta}_R\left(Q^H_{B_\$}-Q^H_R\right)}$. As a result, $\forall \Phi \in \left[min\left(\overline{\Phi},0\right),+\infty\right)$ we will have $Q^H_{B_\$} \geq Q^H_{MF_\$}$. Finally, following Proposition 5 we should have $D^H_{MF_\$} > 0$.

A.5 Proof of Proposition 5:

One foreign country case. Using the optimal θ_F value we can directly take the derivatives: $\frac{\partial \theta_F}{\partial Q^H_{B_\$}} = \frac{1}{\Phi} > 0$, $\frac{\partial \theta_F}{\partial Q^F_{B_\$}} = -\frac{1}{\Phi} < 0$, $\frac{\partial \theta_F}{\partial\left(Q^H_{B_\$}-Q^F_{B_\$}\right)} = \frac{1}{\Phi} > 0$

Multiple foreign countries case. The allocation problem with many foreign countries to invest and asssuming additivity of the convex costs is given by:

$$Max_{\theta_{\underline{F}},\theta_R}\left[Q^H_{MF_\$} - \left(1-\sum_i \theta_{F_i}-\theta_R\right) Q^H_{B_\$} - \sum_i \theta_{F_i} Q^{F_i}_{B_\$} - \theta_R Q^F_R - \sum_i \Phi_i \left(\theta_{F_i}\right)^2 - \zeta\right]$$

The first order condition with respect to country i implies that the share invested in country i is given by $\theta_{F_i} = \frac{Q^H_{B_\$} - Q^{F_i}_{B_\$}}{\Phi_i}$, which implies the following derivatives $\frac{\partial \theta_{F_i}}{\partial Q^H_{B_\$}} = \frac{1}{\Phi_i} > 0$, $\frac{\partial \theta_{F_i}}{\partial Q^{F_i}_{B_\$}} = -\frac{1}{\Phi_i} < 0$, $\frac{\partial \theta_{F_i}}{\partial\left(Q^H_{B_\$}-Q^{F_i}_{B_\$}\right)} = \frac{1}{\Phi_i} > 0$.

A.6 Proof of Proposition 6

First Part: Here I compare price response of the household dollar savings, $D^H_{B_\$}$

Equilibrium without mutual funds. From the optimal household allocation in which households only save dollars in banks we have $D^H_{B_\$,without\ MFs} = \frac{-Q^H_{B_\$}+\delta}{\delta\psi\sigma^2_\varepsilon} + M$. As a result, the price response are given by $\frac{\partial D^H_{B_\$,without\ MFs}}{\partial Q^H_{B_\$}} = -\frac{1}{\delta\psi\sigma^2_\varepsilon}$

Equilibrium with mutual funds. If households save dollars in mutual funds and banks we have the following dollar deposit demand $D^H_{B_\$,with\ MFs} = \frac{-Q^H_{B_\$}+\delta}{\delta\psi\sigma^2_\varepsilon} + \frac{-Q^H_{B_\$}+Q^H_{MF_\$}}{\delta\psi\sigma^2_\chi\left(\sigma^2_\varepsilon+1\right)} + M$ and the price response is given by $\frac{\partial D^H_{B_\$,with\ MFs}}{\partial Q^H_{B_\$}} = -\frac{1}{\delta\psi\sigma^2_\varepsilon} + \frac{-1+\frac{\partial Q^H_{MF_\$}}{\partial Q^H_{B_\$}}}{\delta\psi\sigma^2_\chi\left(\sigma^2_\varepsilon+1\right)}$. Using the envelope theorem in the mutual fund problem, I obtain: $\frac{\partial Q^H_{MF_\$}}{\partial Q^H_{B_\$}} = 1-\theta_F-\overline{\theta}_R$. Therefore $\frac{\partial D^H_{B_\$,with\ MFs}}{\partial Q^H_{B_\$}} = -\frac{1}{\delta\psi\sigma^2_\varepsilon} - \frac{\overline{\theta}_R+\theta_F}{\delta\psi\sigma^2_\chi\left(\sigma^2_\varepsilon+1\right)}$

*Comparison between equilibrium*s. Finally, combining this insights above we get:

$$\left|\frac{\partial D^H_{B_\$,without\ MFs}}{\partial Q^H_{B_\$}}\right| < \left|\frac{\partial D^H_{B_\$,with\ MFs}}{\partial Q^H_{B_\$}}\right|$$

Second Part: Here I compare price response of the aggregate dollar savings, $D^H_{B_\$,T}$

Equilibrium without mutual funds. The price response of the aggregate demand in an economy in which there is only banks is given by $\frac{\partial D^H_{B_\$,T,without\ MFs}}{\partial Q^H_{B_\$}} = -\frac{1}{\delta\psi\sigma^2_\varepsilon}$

Equilibrium with mutual funds. The price response of the total dollar savings in an economy with banks and mutual funds are given by $\frac{\partial D^H_{B_\$,T,with\ MFs}}{\partial Q^H_{B_\$}} = \frac{\partial D^H_{B_\$,with\ MFs}}{\partial Q^H_{B_\$}} - \frac{\partial\theta_F}{\partial Q^H_{B_\$}} D^H_{MF_\$} - \theta_F\frac{\partial D^H_{MF_\$}}{\partial Q^H_{B_\$}}$. Replacing the already obtained derivatives in previous sections and using the optimal allocation of θ_F we get $\frac{\partial D^H_{B_\$,T,with\ MFs}}{\partial Q^H_{B_\$}} = -\frac{1}{\delta\psi\sigma^2_\varepsilon} - \frac{\overline{\theta}_R+\theta_F}{\delta\psi\sigma^2_\chi\left(\sigma^2_\varepsilon+1\right)} - \frac{1}{\Phi}D^{MFs}_\$ - \theta_F\frac{\partial D^H_{MF_\$}}{\partial Q^H_{B_\$}}$

*Comparison between equilibrium*s. From the case in which there is only banks we know that $\frac{\partial D^H_{B_\$,T,without\ MFs}}{\partial Q^H_{B_\$}} = \frac{-1}{\delta\psi\sigma^2_\varepsilon}$. We can replace that condition on the previous equation and write the differential between price responses: $\frac{\partial D^H_{B_\$,T,with\ MFs}}{\partial Q^H_{B_\$}} -$

$\frac{\partial D^H_{B_\$,T,without\ MFs}}{\partial Q^H_{B_\$}} = -\frac{\overline{\theta}_R+\theta_F}{\delta\psi\sigma^2_\chi\left(\sigma^2_\varepsilon+1\right)} - \frac{1}{\Phi}D^H_{MF_\$} - \theta_F\frac{\partial D^H_{MF_\$}}{\partial Q^H_{B_\$}}$. From the optimal demand for mutual funds we know that $\frac{\partial D^H_{MF_\$}}{\partial Q^H_{B_\$}} > 0$ and as $\overline{\theta}_R, \theta_F, \delta, \psi > 0$, we should have:

$$|\frac{\partial D^H_{B_\$,T,without\ MFs}}{\partial Q^H_{B_\$}}| < |\frac{\partial D^H_{B_\$,T,with\ MFs}}{\partial Q^H_{B_\$}}|$$